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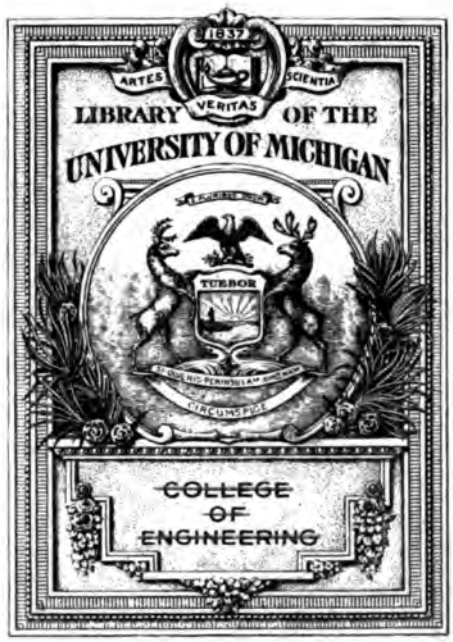
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NO. 2

INCOME IN THE UNITED STATES
ITS AMOUNT AND DISTRIBUTION
1909–1919

INCOME IN THE UNITED STATES

ITS AMOUNT AND DISTRIBUTION

1909-1919

BY

THE STAFF OF THE NATIONAL BUREAU OF ECONOMIC RESEARCH, INCORPORATED

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PREFATORY NOTE

INCOME IN THE UNITED STATES is published in two volumes. The first volume, which has already appeared, is a summary of the findings, intended for readers who are primarily interested in the results. The present volume gives in full the methods and estimates on which the results shown in the first volume are based. In addition, it goes into many details concerning particular industries.

While the Summary Volume was a joint product of the Staff of the National Bureau of Economic Research, the detailed estimates now presented are primarily the work of three individuals. Mr. King is responsible for the estimate of the National Income based on the value product of different industries; Mr. Knauth made the estimate based on incomes received by individuals; and Mr. Macaulay undertook the discussion of the problem of the distribution of income by income-classes.

Unity was preserved by means of many consultations, and the whole book was edited by Mr. Mitchell. Like all the Bureau's publications, the manuscript of the present volume was submitted to the Directors and approved by them; though not before many changes of detail and many suggestions had been incorporated. The Directors have made a constructive as well as a critical contribution to the book as it now stands. At some points, where the manuscript was not changed to accord with individual suggestions, the Directors have inserted footnotes to indicate their points of view.

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CHAPTER PAGE

§ 3c The Value of Animal Products 41
§ 3d The Value of Crops Not Fed to Live Stock 50
§ 3e Payments by Agriculture for the Products of Other Industries 51
§ 3f The Net Value Product of Agriculture 54
§ 3g The Share of the Employees 55
§ 3h The Share of the Entrepreneurs and Other Property Owners 59
§ 3i The Physical Output of Agricultural Produce 59
§ 3j The Relative Position of Agriculture Among the Industries 62
§ 3k Returns for the Efforts of Farm Operators 62

4. MINES, QUARRIES, AND OIL WELLS 65
§ 4a Sources of Information 65
§ 4b The Share of the Entrepreneurs and Other Property Owners 65
§ 4c Total Wages and Salaries 70
§ 4d Number of Employees and Average Earnings 73
§ 4e Total Net Value Product and Share of Employees 74
§ 4f The Mineral Output Compared to Earnings and Population 75

5. FACTORY PRODUCTION 78
(Covering that part of the private Manufacturing Industry included in the totals presented by the United States Census of 1914.)
§ 5a Importance of the Industry 78
§ 5b The Gross Value of the Products 78
§ 5c The Division of the Net Value Product in the Census Years 84
§ 5d Mode of Estimating the Net Value Product for Intercensal Years 86
§ 5e The Share of the Employees 87
§ 5f The Share of the Entrepreneurs and Other Property Owners 91
§ 5g The Fraction of the Net Value Product Paid Out as Wages or Salaries 98

6. SUMMARY OF THE HAND TRADES 99
§ 6a Introduction 99
§ 6b Analysis 101

7. THE CONSTRUCTION INDUSTRY 103
(Shipbuilding Excluded)
§ 7a Introduction 103

CHAPTER PAGE
§ 7b Sources of Data ... 103
§ 7c The Volume of Construction ... 103
§ 7d The Aggregate of Wages and Salaries ... 105
§ 7e The Share of the Entrepreneurs and Other Property Owners: First Estimate ... 107
§ 7f The Share of the Entrepreneurs and Other Property Owners: Second Estimate ... 110
§ 7g Purchasing Power of Share of Entrepreneurs and Other Property Owners ... 111
§ 7h The Total Value of Construction ... 114

8. SUMMARY OF TRANSPORTATION ... 116

9. STEAM RAILWAY, SWITCHING AND TERMINAL COMPANIES ... 119
§ 9a Nature of Available Information ... 119
§ 9b Method of Utilizing Data ... 119
§ 9c The Net Value Product and Its Distribution ... 124
§ 9d The Physical Output per Employee ... 124
§ 9e Growths of Railway Service and of Population Compared 129
§ 9f The Purchasing Power of the Shares in the Net Value Product ... 130

10. PULLMAN CAR TRANSPORTATION ... 133
§ 10a Available Information ... 133
§ 10b The Share of the Stockholders ... 133
§ 10c Share of the Employees in the Net Value Product ... 135
§ 10d Average Annual Earnings of Employees ... 137
§ 10e The Annual Output per Employee ... 138
§ 10f Relative Growths of Pullman Service and Population ... 139

11. EXPRESS COMPANIES ... 141
§ 11a Introduction ... 141
§ 11b Disbursements to Security Holders and Building Owners. 141
§ 11c Total Share of Security Holders and Building Owners ... 141
§ 11d The Share of the Employees ... 143
§ 11e The Total Net Value Product and Its Distribution ... 144
§ 11f The Number of Employees ... 146

12. STREET AND ELECTRIC RAILWAYS ... 148
§ 12a Census Data Available ... 148
§ 12b Share of Security Holders and Other Property Owners ... 148
§ 12c Share of the Employees ... 150
§ 12d Corporate Savings ... 151

CHAPTER PAGE
§ 12e Average Annual Earnings of Employees 152
§ 12f Purchasing Power of Share of Security Holders and Property Owners 153
§ 12g The Average Output per Employee 155
§ 12h Relative Growths of Street Car Service and National Population 156

13. PRIVATE ELECTRIC LIGHT AND POWER COMPANIES 157
§ 13a The Census Data 157
§ 13b The Net Value Product and Its Distribution 159

14. TELEGRAPHS 168
§ 14a The Census Figures 168
§ 14b Disbursements to Stock and Bond Holders 168
§ 14c Corporate Savings 173
§ 14d Purchasing Power of Share of Property Owners and Entrepreneurs 174
§ 14e The Number of Employees and Their Share in the Value Product 175
§ 14f Average Annual Earnings of Employees 177

15. TELEPHONES 179
§ 15a Introduction 179
§ 15b Share of Entrepreneurs and Other Property Owners 179
§ 15c The Net Value Product and Its Distribution 183
§ 15d The Number of Employees 184
§ 15e Average Annual Earnings of Employees 185
§ 15f The Efficiency of the Employees 186
§ 15g Telephone Revenue Compared for Residence and Business Telephones 189
§ 15h Relative Growth of Telephone Service and Population 189

16. TRANSPORTATION BY WATER 191
§ 16a Sources of Information 191
§ 16b Assumption Made 192
§ 16c Mode of Estimating Gross Earnings 192
§ 16d The Share of the Owners and Investors 193
§ 16e The Share of the Employees 195
§ 16f The Net Value Product and Its Division 199
§ 16g The Average Annual Earnings of Employees 199
§ 16h The Tonnage of the American Merchant Marine 201

17. BANKING 202
§ 17a Sources of Information 202

CHAPTER PAGE
§ 17b The Composition of the Net Value Product 202
§ 17c Net Versus Gross Dividends 202
§ 17d Undivided Profits 202
§ 17e The Purchasing Power of Dividends and Interest 204
§ 17f Employees, Salaries, and Wages 205
§ 17g The Share of Salaries and Wages in the Value Product 206
§ 17h Banking Facilities Compared to Population and Income 207
§ 17i Changes in the Volume of Business per Bank 209

18. ALL BRANCHES OF GOVERNMENT 210
§ 18a The Components of the Net Value Product 210
§ 18b The Number of Employees 210
§ 18c The Amount Paid in Wages or Salaries 212
§ 18d The Average Annual Earnings of Employees 213
§ 18e Pensions 215
§ 18f Interest on Public Debts 216
§ 18g The Net Value Product and Its Division 219
§ 18h The Per Capita Net Value Product 220
§ 18i The Share of Government in the National Value Product 221

19. UNCLASSIFIED INDUSTRIES AND MISCELLANEOUS INCOME 223
§ 19a The Field Covered 223
§ 19b Number of Persons Occupied in Unclassified Industries 223
§ 19c The Earnings of Employees 223
§ 19d The Effect of the War on the Number of Employees 224
§ 19e The Profits of Entrepreneurs 225
§ 19f Rents and Royalties 225
§ 19g The Total Share of Enterprise and Property 226
§ 19h Other Classes of Miscellaneous Income 227
§ 19i The Net Rental Value of Owned Homes 228
§ 19j Interest on the Value of Direct Goods 228
§ 19k Profits from Cow-Keeping 229
§ 19l Profits from Raising Poultry and Gardens 230
§ 19m The Division of the Net Value Product 231

20. SUMMARY OF PART I 233
§ 20a The Average Income per Ammain 233
§ 20b Business Savings 234
§ 20c Miscellaneous Summary Tables Not Appearing in Volume I 235

PART II

THE ESTIMATE BY INCOMES RECEIVED

CHAPTER — PAGE

21. INTRODUCTION 249
§ 21a The Problem 249
§ 21b The Method and Data 250

22. TOTAL AMOUNT OF INCOME RECEIVED BY PERSONS HAVING OVER $2,000 PER YEAR 253
§ 22a Introduction 253
§ 22b Estimate from Income Tax Data 253
§ 22c Tax-Exempt Income 260

23. TOTAL AMOUNT OF INCOME RECEIVED BY PERSONS HAVING UNDER $2,000 269
§ 23a Introduction 269
§ 23b Personal Earnings 269
§ 23c The Earnings of Farm Laborers 289
§ 23d Pensions 291
§ 23e The Rental Value of Homes Owned by Their Occupants .. 291
§ 23f Income from Investments 294

24. FARMER'S INCOME 298
§ 24a Introduction 298
§ 24b First Estimate—Based on Total Production and Expenses 300
§ 24c Second Method—Based on Average Ratio of Expenses to Total Product 305
§ 24d Third Estimate—Based on Sample Incomes 308
§ 24e Final Estimate of Farmers' Incomes 310
§ 24f Comparison with Other Estimates 310
§ 24g Farmers Having Incomes Over and Under $2,000 312

25. CORPORATE SURPLUS 314
§ 25a Definition of Corporate Surplus 314
§ 25b The Propriety of Counting Surplus as Part of the National Income 314
§ 25c The Genuineness of Reported Surplus Accounts 315
§ 25d The Data 321
§ 25e Conclusions 328

26. SUMMARY OF PART II 330
§ 26a The Total Income of the United States, 1910 to 1919 330

CHAPTER PAGE
§ 26b The Degree of Error in the Estimate 330
§ 26c Percentage Division of Number of Persons Having Over $2,000 and Under $2,000 Income per Year 332
§ 26d The Percentage of the Total Income Obtained by the Highest 5 Per Cent of Income Receivers 333
§ 26e The Position of the Farmer 333
§ 26f Income in Each Year in Terms of Constant Purchasing Power 333
§ 26g The Average Income per Capita in Each Year 337

PART III

THE PERSONAL DISTRIBUTION OF INCOME IN THE UNITED STATES

27. THE PROBLEM 341
Practical and theoretical difficulties connected with formulation of the problem. Relation of personal distribution to factorial distribution.

28. PARETO'S LAW AND THE PROBLEM OF MATHEMATICALLY DESCRIBING THE FREQUENCY DISTRIBUTION OF INCOME 344
Pareto's Law. Improbability that any simple mathematical expression adequately describing the frequency distribution of income can ever be formulated. Heterogeneity of the data.

29. OFFICIAL INCOME CENSUSES 395
The Australian income census of 1915.

30. AMERICAN INCOME TAX RETURNS 401
Peculiarities of the tax returns from year to year. Irregularities and fluctuations in the *distribution* of non-reporting and understatement. The under-$5,000 and over-$5,000 groups. Wages and total income.

31. INCOME DISTRIBUTIONS FROM OTHER SOURCES THAN INCOME TAX RETURNS 415
Purposes for which existing distributions have been collected make them extremely ill adapted to our use—picked data.

32. WAGE DISTRIBUTION 418
Relations between rates and earnings, earnings and income. Earnings per hour, per day, and per week. Distribution of hours

CHAPTER PAGE

worked in a week, and weeks worked in a year. Federal returns of income by sources. The problem of deriving one regression line from the other.

33. THE CONSTRUCTION OF A FREQUENCY CURVE FOR ALL INCOME RECIPIENTS 424

An income census the direct and adequate method of solving the problem. Piecing together the existing data. Checking them for internal consistency and agreement with collateral information. Conjectural nature of final results.

PART I

THE ESTIMATE BY SOURCES OF PRODUCTION

By

WILLFORD I. KING

ASSISTED BY

VIRGINIA SANDMEYER
DOROTHY J. ORCHARD
KATE E. HUNTLEY

CHAPTER 1

PRINCIPLES AND METHODS

§ 1a. Basis of Estimates

The object of this study is to ascertain the total annual income which the people of the United States derive from each of the leading industrial fields. The method used for ascertaining this total for each industry is first to find out how much income is withdrawn from the industry for individual use and then to add to this amount the total savings made during the year and retained in their business by all the enterprises engaged in the industry in question.

§ 1b. Business Savings Counted as Income

That business savings really constitute a part of the national income for the year in which they are made has been denied by some students of the subject. The ground for their contention is that such savings merely make possible an increase in the income of future years and hence should be ignored in the income report of the year when the saving is done.

This method of treating business savings, though plausible, is open to grave objections. The income with which we are dealing throughout this study is *book* income, that is the amount shown as net gain by an accurate accounting system and is radically different from psychic income which accrues only when the goods render service to the consumer. In the accounts of practically every business, the net income as recorded includes the annual surplus as well as all disbursements to stockholders or owners. This uniform policy shows that a consensus of opinion exists among accountants that savings are a form of income. If the accountants are wrong, we are driven to the conclusion that the amount of the annual income of a corporation may be altered greatly by a vote of the directors, concerning the disposition of earnings! Furthermore, when a corporation reports increased net earnings, even if no dividends are declared, the stock tends to rise sharply in value, and any stockholder may at once realize personal income by selling his shares at the enhanced price. For the reasons stated, it seems best to include business savings in the income for the current year.

§ 1c. Net Versus Gross Disbursements

A number of the great industrial fields of the United States are dominated by corporations and, in such cases, a study of the income created by

the industry is mainly an analysis of corporation reports. This is emphatically true in the case of the various branches of transportation. Now corporations do not show in their published reports the amounts of interest and dividends disbursed to private individuals as contrasted with sums of similar nature paid to other business enterprises. But in making up a total of income for the country, these inter-business payments must be eliminated to prevent duplication. The method adopted for accomplishing this result is to deduct from the sum of interest and dividends paid out by a corporation all bond interest and dividends received from other corporations. This plan rests upon the principle that the corporation making the final payment is, in this instance, merely an intermediary between the original corporation and the private investor. This principle seems to be logical although its application occasionally gives rise to certain difficulties in differentiating between disbursements and business savings.

§ 1d. What the Net Value Product Includes

The net value product of each industry is assumed, for the purposes of this study, to include the returns for the services of all persons engaged in the industry, whether these persons are proprietors or employees, and of all property aiding in the productivity of the industry. It has, for example, been assumed that the stockholder or other entrepreneur owning an equity in a plant, the holder of the mortgage on the plant, and the lessor of property utilized by the business are all alike dependent upon the gains of the enterprise for at least part of their income, and hence may all be classed together as being owners of property devoted to the undertaking.

§ 1e. Estimating Individual Income from a Study of the Product of Industries

Owing to the form in which the data for some industries are available, it is impossible to estimate directly the amounts of income derived from them by individuals or saved by the business enterprises in the industry. In such instances, one naturally has recourse to the alternative method of subtracting from the gross output of the industry in question all payments made to other industries for the materials or services which they have contributed. In following this method, the ideal course of procedure, in the case of any industry, is to deduct from the gross value of its products not only the cost of materials used but also such payments as freight and insurance charges, bank interest, and those taxes which represent the value of government aid and protection, furnished to the industry. The amount remaining after these deductions have been made represents the net income —a quantity which may be either saved or distributed to individuals. In general, every industry is credited with all goods sold to dealers, consumers,

or other industries, and debited with all indirect or production goods received from other industries. Government, like any other industry, ought to be credited with the value of its services and debited with the indirect or production goods received from other industries. An industry can never be debited with charges for direct or consumption goods,[1] for these are not used to further its business or add to its output.

Just as industries pay freight charges for the services of railways, so they also pay taxes to meet the cost of government. In so far as the tax money buys from government indirect (production) goods or secures services in the form of protection or assistance to the industry, the industry in question evidently ought to be debited with the tax just as it is debited with freight charges. In so far, however, as the tax money paid by an industry goes not to pay for aid to the industry but instead to buy direct government services to individuals, the industry cannot justly be debited with such taxes; for, in such cases, the services of government are not business aids but are forming part of the consumable income of individuals and therefore fall into the category of direct services—a class which, according to the principles enunciated above, are never to be charged against an industry.

This line, however, between the taxes that theoretically should and theoretically should not be deducted from the gross value of an industry's output is impossible to draw in practice. Statistically, the only feasible course is to deduct all of the taxes levied on the business.[2] Such a deduction inevitably gives rise in most instances to an error in the final results—unfortunately only one of several types of unavoidable error to which it is necessary to call attention at this point.

§ 1f. Impossibility of Measuring Value of Government Service to Business

One of the most serious of these errors arises from the impossibility of dividing all services rendered by the various branches of government into two classes, namely:—

1. Those rendered to business.
2. Those serving the people directly.

This impossibility has compelled us to act on the basis of the assumption that the taxes levied against each field of business are equivalent to the value of the service rendered to that industry by government. This assumption is, however, likely to be far from the truth. In 1918, for example, manufacturing corporations paid to the Federal Government $2,112,044,-

[1] Expenses for welfare work, for example, are not deductions from the value product of an industry.

[2] See Volume I, Chapter 2, Sec. IV for a further discussion of this point.

810 as income tax, war profits tax, and excess profits tax, and considerable additional amounts were paid by individual manufacturers and partnerships operating in this field. Exact statistics are not available, but the indications are that the entire agricultural industry did not pay to the United States Government over $100,000,000 in these classes of taxes.[1] It seems highly improbable that in 1918 the Federal Government rendered to the manufacturing industry service valued at more than twenty times that furnished to agriculture. It may well be that the aid of the National Government to the farmers' business was worth more than $100,000,000 but it scarcely appears credible that the manufacturers received service worth over two billions. According to the plan followed in this study, however, the two billions have been considered as an expense to the manufacturing industry and deducted. Any part of this amount which is in excess of the value of the services of the Federal Government to the manufacturers, represents a forced contribution to the general welfare and should, in order to obtain the correct figures for 1918, be added to the net value product of manufacturing recorded in this study.

If this type of error results in an underestimate of the income arising from manufacturing, it may, on the other hand, show too high value products for some other fields; for industries may exist which government has served much but taxed little. Unfortunately it is not at all certain that the errors arising from this source cancel out, for we cannot measure even approximately the total value of the service rendered to business by government. It seems likely, however, that, since 1917, business taxes have been more than sufficient to pay for the services rendered to business by all branches of government. If so, this excess should be added to the total income as reported in this study in order to obtain the correct total for the nation.

§ 1g. Are Corporate Surpluses Accurately Reported?

Another possible source of grave errors is found in the estimates of the business savings of the various industries. In most instances these estimates have been based upon reported surpluses of corporations operating in that field. It, therefore, becomes a question of prime importance to know whether the reported size of such surpluses is reasonably close to the truth or whether the stated amounts are far too large because of failure to allow sufficient amounts for depreciation, or are entirely too small, because many improvements have been charged to operating expenses. Manifestly it is impossible to go behind the returns of the reporting concerns, but it is nevertheless possible to ascertain by indirect methods something about the validity of the accounting systems used by the average corpora-

[1] See U. S. Bureau of Internal Revenue, *Statistics of Income*, 1918, pp. 11 to 16.

tions. If reported surpluses are genuine, they should add to the earning power of the companies accumulating them in proportion to the ratio which these surpluses bear to the total of previous investments. An investigation by Mr. Knauth indicates that, in practice, earnings have increased in just about this proportion. It appears, therefore, that no great error is likely to arise from the practice of accepting as accurate the amounts of surpluses reported; hence this practice has been adhered to throughout this study.

§ 1h. Minor Errors and Irregularities in the Tables

It is perhaps wise at this point to mention certain mathematical details connected with the presentation of data in the accompanying tables. The basic figures in most instances have such a margin of error that errors in multiplication or division arising from the use of a 12 inch slide rule are of negligible importance, hence this instrument has been frequently used. The result is that a computation by more accurate means will occasionally reveal errors in the fourth significant figure.

In numbers of instances, original computations have been carried to more places than are shown in the quantities entered in the tables here presented, hence it follows that an item in a total column may differ slightly from the nominal sum of the items in the columns from which the total is derived.

Owing to the inherent characteristics of the decimal system, when all of the percentages composing a whole are read to any given decimal place, the recorded items may not add up to exactly 100. The same principle applies to decimal fractions. The quantities have been correctly entered, no attempt being made to obtain a total of 100 (or of 1, as the case may be), by distorting the component parts.

§ 1i. Possible and Probable Errors of Estimates

It is, of course, impracticable to estimate with accuracy the size of the possible or probable error in each of the items entering into the total. However, it is clear that the likelihood of error is far greater in some instances than in others. An attempt has been made, therefore, to record for each of the principal items two estimates of error: namely, *the probable*, and *the maximum reasonable*. *The probable error* is defined as being such that the chances are even that the error is greater or less than the amount stated. *The maximum reasonable error* is defined as being so large that the chances are ten to one that it will not be exceeded. The 1918 estimates for these errors of the various items follow:

TABLE 1A

ESTIMATED ERRORS IN THE ITEMS OF THE NATIONAL VALUE PRODUCT IN 1918

Industry	Division	Millions of dollars		
		Size of item	Probable error [a]	Maximum reasonable error [b]
Agriculture	Crops	7,119	500	1,500
"	New Land	405	200	600
"	Animal Products	6,189	500	1,200
"	Deductions	—1,031	200	400
Mineral Production	Wages and Salaries	1,422	70	250
" "	Rent	214	40	80
" "	Savings	79	20	70
" "	Remainder	298	30	100
Factory Production	Wages and Salaries	12,378	200	600
" "	Rent	137	70	200
" "	Remainder	3,503	300	800
Construction	Wages and Salaries	964	150	400
"	Remainder	317	100	250
Automobile Repairing	Total	367	90	180
Laundry	Wages and Salaries	106	15	35
"	Remainder	84	15	70
Custom Grist Mills	Wages and Salaries	2	1	2
" " "	Remainder	13	8	15
Custom Saw Mills	Wages and Salaries	2	1	2
" " "	Remainder	3	1	3
Shoe Repairing	Total	111	50	140
Tailoring, Dyeing & Cleaning	Total	661	150	500
Repair of Machines	Total	61	40	75
Blacksmithing	Total	210	80	300
Custom Dressmaking	Total	83	70	120
Railways, Switching & Terminal Companies	Wages and Salaries	2,763	10	100
Railways, Switching & Terminal Companies	Remainder	807	50	250
Pullman Co.	Wages and Salaries	24	3	7
" "	Remainder	10	1	4

[a] Even chances.
[b] Ten chances to one that the error is not larger than this amount.

TABLE 1A—*Continued*

Industry	Division	Millions of dollars		
		Size of item	Probable error	Maximum reasonable error
Express Co.	Wages and Salaries	93	1	3
" "	Remainder	—14	3	7
Street Railway	Wages and Salaries	314	10	35
" "	Remainder	124	10	40
Commercial Electric Light & Power	Wages and Salaries	97	5	15
Commercial Electric Light & Power	Remainder	160	20	50
Telegraph	Wages and Salaries	49	2	8
"	Remainder	18	2	9
Telephone	Wages and Salaries	194	5	15
"	Remainder	85	6	20
Transportation by Water	Wages and Salaries	421	30	150
" " "	Remainder	85	20	60
Banking	Wages and Salaries	281	20	60
"	Dividends	87	15	30
"	Surplus	194	6	20
"	Remainder	204	15	70
Government	Federal	3,814	200	600
"	State and County	384	30	100
"	Municipal	707	30	150
"	Municipal Utilities	39	4	15
"	Schools	578	15	100
"	Deductions	—170	20	50
Unclassified Industries	Wages and Salaries	7,022	400	1,200
" "	Corporate Profits	1,047	100	400
" "	Individual Profits	4,601	700	1,600
" "	Rents	263	80	400
Miscellaneous Income	Urban Agriculture	364	80	240
" "	Home Rental Value	1,237	200	600
" "	Interest on Consumption Goods	1,275	200	600
Total		60,854	5,194	14,900
Probable Error of Total			1,266	
Maximum Reasonable Error of Total				3,566

The estimated probable error of the total, as computed by the usual formula from the items given, amounts to 1.3 billions. The maximum reasonable error of the total as shown by an experimental test with the items given appears to be about 3.6 billions of dollars. The evidence

indicates, therefore, that the total is close enough to the truth to meet the needs of most students of the subject, the error presumably being not greater than six per cent and perhaps very much less.

Since the errors for the other years of the decade are presumably similar in proportionate size to those in 1918, no separate computations have been made therefor.

§ 1j. General Plan of Presenting Estimates

The general plan of exposition determined upon is to attempt to show for each of the leading industrial fields covered by the Census:—

1. The net value product.
2. The share of the employees in the value product.
3. The average annual earnings derived from the industry by each employee.
4. The share of the entrepreneurs and other property owners in the net value product.
5. The purchasing power of each of the above items at prices of 1913.
6. Changes in the physical output per employee.
7. Changes in the physical output per inhabitant of the United States.
8. The average number of employees actually at work
9. The average number of employees attached to the industry.

Frequently it has been possible to determine from the available figures other facts of interest and these facts have been worked out to a limited extent.

In some cases, however, since it has not been feasible to cover even the standard list of inquiries, results have been presented which are not entirely complete.

While an effort has been made to outline the general *modus operandi* in most instances, it has been found impracticable to present all of the details. Those especially interested in the procedure followed may through personal or written inquiry obtain such additional information as the records of the Bureau afford.

§ 1k. Reduction of Values to Money of Constant Purchasing Power

The plan of attack decided upon has required that, in most instances, amounts be first estimated in money of current purchasing power, or, in other words, in terms of book income. The price changes during the latter part of the decade have, however, been so large that comparisons of money values for different years tell practically nothing about the variations that have occurred either in the physical volume of business or in the quantity of goods that the income will buy. It has been necessary, therefore, to convert many items into figures representing values in money of constant

purchasing power. For this purpose, prices of the year 1913 have commonly been taken as standard, this year being the base used by the United States Bureau of Labor Statistics and by numerous other organizations.

The accuracy of the results obtained by such conversions evidently varies in proportion to the correctness of the price indices used as divisors. The United States Bureau of Labor Statistics "cost of living" index has been assumed to be satisfactory for the purpose of reducing wages and salaries to a comparable basis. Since this index has not been computed for the years preceding 1913, it has been necessary to extend it back by means of a special investigation. As a test, this Bureau computed the index for the years 1909 to 1918 and compared the figures for the six overlapping years (1913 to 1918) with the Government figures just mentioned.[1] The fact that the correspondence between the two index series proved very close leads to the belief that errors arising from the faultiness of this index series are not of major importance.

While the general principle to be followed in correcting the income of the working classes is quite obvious, the best method of converting the income from property and enterprise to the 1913 base is not so easy to determine. Since a considerable fraction of personal income of large property owners is invested rather than immediately consumed, the propriety of using an index of prices of consumption goods as a correcting factor for this type of income may well be questioned. Careful consideration has been given to this point, and the conclusion has been reached that no other price index can as legitimately be used for this purpose. Investments are so heterogeneous in their nature that it is difficult to say just what type should be considered and what weight should be assigned to each. Prices of indirect goods, whether stocks of corporations or commodities at wholesale are certainly to a large degree, merely reflections of prevailing opinions of what prices of direct (consumption) goods are expected to be at a later date. In so far as this is true, it appears more logical to base a correcting factor for the present date upon prices having their origin in expenditures for present consumption than upon those reflecting anticipated future needs. After all, expenditures for consumption goods form no mean proportion of the total income of all except the very wealthiest families. It is believed, therefore, that the procedure followed is more logical than any other that can be practically applied.

It might seem reasonable to deal with business savings by using the same method applied to the personal income of the property owners. However, it is evident that the immediate function of the first mentioned type of income is to strengthen the business rather than to purchase consumption goods. Normally such savings are invested in new plants or equipment.

[1] See Section 2b.

For this reason, the policy has been followed of dividing the business savings in each field of industry by an index believed to approximate the changes in construction costs in that branch of industry for the same year.

§ 11. Average Annual Earnings Versus Wage Rates

While average annual earnings do not always give a good picture of the absolute economic condition of the employees in an industry at a given time, they are usually distinctly valuable as indices of change in welfare from year to year. The wide difference in nature between wage rates and earnings should not be overlooked. Wage rates measure the price of a specific amount of labor; earnings are connected more closely with the economic welfare of the employee and his family. Earnings may be materially reduced by a shortening of hours or an increase in unemployment at the same time that wage rates are stationary.

The United States Census Bureau commonly reports for various industries the total amount of wages paid and the average number of wage earners employed. If the first quantity is divided by the second, the quotient represents approximately the average earnings of a full time worker,[1] rather than the average earnings of the workers who normally make their living in this field of endeavor. To obtain average annual earnings, it is necessary first to estimate for each year the average number of workers attached to the industry and then to divide thereby the aggregate of wages paid. Such an estimate has been made for each industry. The mode of estimating the number of employees attached to, or in other words, normally making their living in a given industry, is discussed in Chapter 2.

§ 1m. Interest Payments on Consumption Loans Not Deducted from Income

One of the most puzzling theoretical problems encountered during the investigation has to do with interest on loans made for the purpose of purchasing goods for direct consumption. Does sound logic require the deduction of such interest payments from the gross income of the borrower, when calculating his net income? The practical bearing of the question is principally in connection with the Liberty Loans which represent billions borrowed from the bond buyers by the citizens in general in order to obtain such immediately consumable war supplies as powder and shells. The bonds were originally held by persons advancing money to relieve others from paying at that time their respective proportions of the cost of the war. This advance of money did not necessarily add anything to the aggregate

[1] A full time worker is one who works the number of hours designated by the employer as "full time." For a fuller discussion, see § 2d.

of the actual physical product. It merely meant that potential taxpayers retained too large an income during war time on the understanding that they pay a bonus, known as interest, for the privilege of meeting, from later income, their full share of the burden. It may be contended, therefore, that if interest receipts are included in the total income of the people, it is only fair to deduct these amounts from the incomes of the taxpayers.

The opposite point of view which has led to the inclusion of these interest payments in the net value product is that the advantage to the taxpayers of being allowed to postpone the time of payment was evidently felt to be real enough to make them willing to pay money for the privilege. Furthermore, if the taxpayers feel that the privilege of postponing the assumption of their respective shares of the burden is not worth the interest charge, they always have the option of paying off the debt. According to the definition followed in this study, an advantage of the type just mentioned is a service which constitutes income, and such income must be added to the actual physical product in order to arrive at the net value product, or in other words, at the total income of the country.

Similar reasoning applies with equal force to interest on all sums borrowed for the purpose of obtaining consumption goods, whether the borrowing is done by government or by private individuals.

While the arguments just stated have seemed to be weightier than any on the opposite side, it must nevertheless be admitted that a strong case can be presented for pursuing the opposite course in this computation and for this reason, government interest payments have been segregated so that those who prefer may subtract them from the estimates of aggregate national income for the various years (as presented in Volume I), in order to secure totals according with their beliefs.

CHAPTER 2

PRELIMINARY STUDIES

§ 2a. An Estimate of the Population of the United States for the Intercensal Years

In the course of the present investigation, it has been found essential to have a reasonably accurate estimate of the population of the United States for each of the intercensal years. The method of interpolation used in obtaining the estimates presented in the Statistical Abstract of the United States consists in taking one-tenth of the arithmetic increase since the preceding Census and adding this amount to the Census figure to find the population for the next year; similarly the population for each of the succeeding years is calculated by adding this same number to the estimate for the year previous. This process is a straight line extrapolation and has nothing but simplicity to commend it, for, when applied, errors of considerable size gradually accumulate as changing conditions affect population growth. For example, the Census shows a population on January 1, 1920, nearly two millions less than that given by following the method just described. Is there a more accurate way of estimating the population in advance of the Census? If so, what is it? In the hope of answering these questions, the following study has been made.

For recent years, the Census Bureau has compiled figures showing the birth rate and the death rate for the registration area and this registration area has been steadily growing larger until it now appears to be fairly representative of the country as a whole. The Commissioner of Immigration presents annual statistics showing the number of aliens admitted and departed. It seemed to the Staff of this Bureau that these figures might readily be used as a basis for estimating the population, year by year. This view was later endorsed by officials of the United States Census Bureau.

The mode of procedure followed has been relatively simple. The birth rate and the death rate are given for the calendar year while immigration is reported for the fiscal year. By aid of smoothed curves, the birth and death rates have been estimated for the fiscal years and the excess of the birth rate over the death rate has been calculated. The population for June 30, 1910, has been estimated according to the method employed in the Statistical Abstract. The estimated excess of the birth rate over the

death rate has been applied to this population to find the increase due to the excess of births over deaths during the fiscal year ending June 30, 1911. This amount plus the excess of immigration over emigration has been added to the population estimate for June 30, 1910, and the resulting sum has been assumed to be the population for June 30, 1911. This number has been taken as a new base and the process has been repeated for the next year—and so on up to the Census of 1920. The estimate thus arrived at for January 1, 1920, is in error by approximately half a million, or only about one-fourth of the corresponding error resulting from the method of estimate used in the Statistical Abstract. It has been assumed that the error was equally distributed among all intercensal years and, by correcting in accordance with this assumption, a revised preliminary estimate of the population for each year has been secured.

Since the Census estimates of birth and death rates for the various years are based upon population estimates which are considerably too high for the last years of the decade, it seems probable that these reported birth and death rates are both somewhat too low for the period just mentioned. Following this assumption, these rates have been increased in the same ratio that the Census estimate of population bears to the revised preliminary estimate made according to the procedure described above. These revised rates have been applied to the revised preliminary estimates of population and the products have been taken as the net additions to the population arising from the excess of births over deaths. By use of these increments and those due to the excess of immigration over emigration, the population has been again built up year by year on the basis of the 1910 Census. The estimate obtained in this manner for January 1, 1920, differs by only 414,000 from the Census count at that date.

This difference has been apportioned equally among the various years of the decade giving as a final estimate the figures shown in the accompanying table.

TABLE 2A

AN ESTIMATE OF THE POPULATION OF THE UNITED STATES FOR THE INTERCENSAL YEARS

Date	Estimated number per thousand inhabitants				Estimated thousands added during the fiscal year [c] to the population of the U. S. by excess of		Estimated population of the Continental U. S. (Thousands)	
	Calendar year		Excess of births over deaths					
	Births [f]	Deaths [h]	Calendar year	Fiscal year [a,c]	Births over deaths [j]	Immigration over emigration [k]	June 30 [l]	Jan. 1 [m]
1909	26.2 [g]	14.4	11.8	12.0	1,078	544	90,370	89,557
1910	25.8 [g]	15.0	10.8	11.3	1,033	818	(91,972 [d]) 92,229	91,340
1911	25.6 [g]	14.2	11.4	11.1	1,033	512	93,811	(91,972 [d]) 93,070
1912	25.4 [g]	13.9	11.5	11.5	1 088	402	95,338	94,600
1913	25.2 [g]	14.1	11.1	11.3	1,088	815	97,278	96,290
1914	25.0 [g]	13.6	11.4	11.3	1,110	769	99,194	98,310
1915	24.9	13.5	11.4	11.5	1,147	50	100,428	99,870
1916	24.8	14.0	10.8	11.2	1,131	126	101,722	101,080
1917	24.6	14.2	10.4	10.6	1,084	216	103,059	102,410
1918	24.4	17.7	6.7	10.3	1,067	19	104,182	103,660
1919	24.2	12.9 [i]	11.3	5.8	607	21	104,847	104,310
1920				14.6 [b]	771 [b]	71 [b]	106,357	105,709 [e]

a Corrected to account for adjustments in population used as a base; quantities read from a curve.
b This is an estimate for the last half of 1919 only.
c Ending June 30 of the given year.
d Census count for April 15, 1910.
e Census count for January 1, 1920.
f Census Bureau, *Birth Statistics for the Birth Registration Area of the United States.*
g Estimated from a smoothed curve produced.
h *Statistical Abstract of U. S.* for 1919, p. 80.
i Preliminary estimate by Census Bureau.
j Rates in preceding column times the population calculated by the preliminary method described in the text.
k From *Statistical Abstracts of the U. S.*
l For mode of derivation, see text.
m Derived from the immediately preceding column by aid of a smoothed curve.

It is true that it would be impossible to obtain results of the degree of accuracy here presented were it not for the existence of a Census count at each extremity of the period studied. Nevertheless, by following practically the same method, omitting only the adjustments used to make the data conform to the Census of 1920, it appears that the estimate for January 1, 1920, would be in error by only about 495,000.

It is not improbable that even this degree of error might be reduced somewhat if one used monthly instead of annual figures for immigration and the rates for births and deaths. Doubtless other refinements might be introduced. However, the residual error after applying the simple method just presented is unimportant for most practical purposes. It seems, therefore, that this plan of estimating the population of the United States for intercensal years is well worthy of the consideration of statisticians.

An interesting by-product of this study is the light thrown upon the ultimate apparent effect of the influenza epidemic of 1918 upon the population of the country. The fatality caused by the disease was so great

that the population on January 1, 1919, was but little larger than on June 30, 1918. This fact is not at all surprising, but the remarkable feature is that the death rate during 1919 was so much reduced (despite the extensive recurrence of influenza in that year) that the population on January 1, 1920, was probably little if any less than it would have been had the influenza epidemic not occurred.

These figures lead one to inquire whether influenza ought not to be regarded principally as a hastener rather than as a primary cause of the death of its victims. The only other reasonable explanations of the great fall in the death rate for 1919 would seem to be that influenza had a beneficent effect in stimulating the health of the survivors or that some unknown cause greatly interfered with the action of deadly diseases in 1919. Neither of these latter assumptions seems as probable as the hypothesis suggested in the original query.

§ 2b. An Index of the Prices of Consumption Goods Used by Manual and Clerical Workers' Families

Data showing the average annual money wages or annual book income received by any class of workers have little meaning unless such wages or income are compared with the changes in the average prices of the goods usually bought by such workers. The recent wide variations in the price level have made this fact evident even to the most casual observer. It is, therefore, essential that a reliable index of prices paid for commodities consumed by the working classes be at hand.

Recently, the United States Bureau of Labor has published such an index number covering the years 1913 to date, but it has presented none for the years 1909 to 1912. The index number worked out by the National Bureau of Economic Research is the result of an attempt to fill in this gap. Unfortunately, complete data are not available for all fields; hence it has been necessary to use estimates of doubtful value in place of actual figures for certain items. For example, no figures showing the trend of house rents for the earlier half of the decade have been discovered. Other missing items are, fortunately, mostly those of very minor importance.

In constructing the price index, the classification made by the United States Bureau of Labor has been followed closely, all commodities being divided into six general classes:—namely, Food, Clothing, House Furnishings, Housing, Fuel and Light, and Miscellaneous. In the case of each group, the index has been constructed to cover the period 1909-1919, the year 1914 being used as the base year. In deriving the index number herewith presented, recourse has been had to two apparently distinct but actually related methods of computation; first, the comparison of aggregates of actual prices based upon the estimated quantities used in the base year;

second, the weighted arithmetic average of relatives, the weights used being likewise the quantities assumed to have been used in the base year. Since the same base year and the same weights have been used, the two methods necessarily give identical results—as can easily be demonstrated by simple arithmetic.

The reason for varying the method lies in the fact that the original data were partly in the form of actual prices and partly in terms of relative numbers only. In the case of fuel and light, for example, the Bureau of Labor reports furnish relative numbers from 1909 to 1914 and actual prices from 1914 to date. Under such circumstances, convenience dictated the use of the particular method of computation that involved least labor. In the main, the procedure was as follows: Aggregates of prices were computed for the sub-groups; these aggregates were reduced to relative numbers; and these relatives were then weighted and combined to give the final index.

Food.

For the food group, the index number constructed by the Bureau of Labor and published in the *Monthly Labor Review* each month seems to be entirely satisfactory and hence has been used. In recent years, that index number is based upon the year 1913. For our purposes, it has been necessary to adjust it to the common 1914 base. This has been done by dividing each annual index by the index number given for 1914 and multiplying the results by 100.

Clothing.

The articles of clothing included in this group, and the weights used are based upon the list given by the Bureau of Labor in the *Monthly Labor Review* for November, 1919, pp. 2 to 14—a list showing the actual apportionment of expenditures for clothing by working families of Northern and Southern Cities. Since it is not easy to find quotations of clothing prices which are comparable from year to year, it was decided to have recourse to figures quoted by some mail order house, for by use of the catalogue, it is possible to identify with a fair degree of accuracy the same article in different years. Sears, Roebuck & Company were kind enough to place a series of their catalogues at our disposal. From these were selected forty-three articles of men's clothing and forty-four articles of women's wear, which seemed to be practically identical in quality throughout the decade under consideration. The price of each article was then multiplied by the average number of units purchased per family per year, as shown by the Bureau of Labor study above mentioned. As the figures are given for Northern and Southern cities separately, an average weight

for the country was made by weighting the Northern cities two and the Southern cities one, the larger weighting being given to the North because that section is so much more populous.

A total value for each article having been thus calculated, the values for the various articles were next summated in order to obtain an aggregate value for all articles in the given year. The aggregate value for 1914 was then taken as a base and called 100, and indices for other years were derived by a comparison of the relative sizes of the aggregate values.

House Furnishings.

As in the case of clothing, the weighting system is based upon a list published by the Bureau of Labor [1] showing the average annual expenditure by working families in the cities of the United States for various articles of furniture and the number of each item of furniture purchased each year by the average family. As in the case of clothing, the prices have been taken from the annual [2] catalogues of Sears, Roebuck & Company. The method of computation used is identical with that already described for clothing.

Fuel and Light.

In working up an average index of prices of fuel and light, it was possible to get satisfactory quotations for coal (anthracite and bituminous), manufactured gas, and electricity.

The prices on January 15th and July 15th of each year from 1914 to 1919 for coal in ton lots for household use are published in the *Monthly Labor Review*.[3] Separate quotations are given for bituminous coal and two kinds of anthracite, namely, stove and chestnut. The actual prices for the years 1914 to 1919 were reduced to relatives on the 1914 base. Relative prices for each of the three items had already been computed by the Bureau of Labor Statistics for the years 1909–1914,[4] and were simply transcribed as quoted.

The mean of the relatives for stove and chestnut coal was used as representative for anthracite. The relative numbers for anthracite and for bituminous coal were then weighted by the respective annual costs per average family in the year 1919 for the two varieties of coal as shown by figures published in the *Monthly Labor Review*.[5]

Manufactured Gas: The average net price per 1000 cubic feet of gas

[1] *Monthly Labor Review*, Jan. 1920, pp. 27–34.
[2] Clothng prices were taken from the spring catalogue issued Jan. 1st, and furniture prices from the autumn catalogue issued Sept. 1. The indices for each group have been adjusted to the middle of the year before computing the average price index for all commodities.
[3] *Monthly Labor Review*, March, 1920, p. 63.
[4] *Statistical Abstract of the U. S.*, 1915, p. 531, table 300.
[5] *Monthly Labor Review*, Sept. 1920, pp. 92–99.

was computed by taking quotations of the price of gas from a number of widely distributed cities [1] and getting the average of these quotations. These averages were reduced to relatives on the 1914 base. The annual cost of gas per average family per year was ascertained from the Bureau of Labor Statistics report [2] and the relative prices of gas were weighted by this figure.

Electricity: Estimates of the average price per kilowatt hour of electricity used in residences in New York City were obtained from the New York Edison Company, and these were reduced to relative prices on the 1914 base. As in the case of coal and gas the average cost per family per year was derived from information published in the *Monthly Labor Review* [2] and the relative prices of electricity were weighted by this figure. The sum of the weighted relatives for these various items making up the fuel and light group, was divided by the sum of the weights used and the resulting figure was taken as the index for this group.

Housing

In their recent investigation into the cost of living, the National Industrial Conference Board made a study of changes in the cost of Shelter [3] during the period 1914–1919, using 1914 as the base year. The results of this study are charted in their report, and from this chart have been read the index numbers used in making up our average index.

Careful search has failed to bring to light any information whatever concerning the course of house rents before 1914. As the years 1909 to 1914 were characterized by a relatively stable level of prices, it has seemed best to assume that house rents remained unchanged during this interval and hence to use 100 as the index for each year.

Miscellaneous Expenditures.

In constructing the index number for the miscellaneous group, again the weights were based upon the information given in the *Monthly Labor Review.*[4] After much difficulty, approximate price quotations were secured for thirteen items of this list, namely, railway passenger fares, telephone rates, street car fares, automobile repairs, automobile tires, gasoline, moving picture tickets, newspapers, magazines, college tuition,[5] room and board at college,[5] hotel rates for lodging,[5] and retail prices of tobacco, and these items were assumed to be fairly representative of the miscellaneous group.

[1] *Statistical Abstract of the U. S.*, 1917, p. 550; 1919, p. 576.
[2] *Monthly Labor Review*, Sept. 1920, pp. 92–99.
[3] National Industrial Conference Board, *Research Report*, No. 28, May, 1920.
[4] Nov. 1919, pp. 15–19.
[5] These items are of minor importance and hence are weighted lightly.

The actual prices of each article were reduced to relatives on the base 1914. The relatives were then weighted by the average cost per family for each item as shown by the Bureau of Labor study for 1919. The sum of the products for each year was divided by the sum of the weights for the same year in order to arrive at the index number for that year.

AVERAGE INDEX FOR ALL EXPENDITURES FOR CONSUMPTION GOODS.

The average indices for the separate groups having been obtained for the various years by the methods above described, the next step was to combine them into an index representing the entire expenditures for consumption goods. This combination was effected by multiplying the indices by weights representing, for 22 cities in the United States in which the United States Bureau of Labor Statistics conducted investigations in 1919, the per cent of all expenditures, devoted to each class of items.[1] The actual numbers used as weights are as follows:

ITEM OF EXPENDITURE	PER CENT OF TOTAL EXPENDITURE
All purposes	**100.0**
Food	38.2
Clothing	16.6
Housing	13.4
Fuel and Light	5.3
House Furnishings	5.1
Miscellaneous	21.3

The sum of the products for each year was divided by the sum of the weights for the same year to obtain the average index for that year. The final results of the study are presented in the accompanying table.

The fact that the indices from 1914 to 1919 correspond so closely to those computed by the Bureau of Labor Statistics makes it appear probable that the indices for the years 1909 to 1913 are also not far from the truth. The only important reason for suspecting any greater margin of error in the earlier years is the absence of rent data for that period. However, it is improbable that there were variations in this relatively small item sufficiently great to vitiate materially the average indices for the whole group. It seems safe, therefore, to use the figures presented as a representative index of the average prices of those consumption goods purchased by the working classes of our population during the different years of the decade under consideration.

[1] *Monthly Labor Review*, October, 1920, p. 65.

TABLE 2B

A COMPARISON OF THE VARIOUS INDICES PURPORTING TO SHOW AVERAGE CHANGES IN THE PRICES OF CONSUMPTION GOODS BOUGHT BY THE MANUAL AND CLERICAL WORKERS OF THE CONTINENTAL UNITED STATES

Year	Indices											
	All Consumption Goods			Food			Clothing			Housing		
	N.B.E.R.[b]	B. of L.[dg]	N.I.C.B.[a]	N.B.E.R.[bdg]	B. of L.[dc]	N.I.C.B.[a]	N.B.E.R.[b]	B. of L.[ed]	N.I.C.B.[a]	N.B.E.R.[bc]	B. of L.[ed]	N.B.C.I.[a]
1909	93.2			87.2	87.2		91.6			100 [f]		
1910	95.5			91.2	91.2		95.1			100 [f]		
1911	96.0			90.2	90.2		96.9			100 [f]		
1912	97.1			96.1	96.1		96.5			100 [f]		
1913	97.7	99.0		98.0	98.0		97.0	99		100 [f]	100	
1914	100.0	100.0	100.0	100.0	100.0	100	100.0	100	100	100	100	100
1915	99.2	102.0	100.5	99.0	99.0	100	104.4	102	103	100	101	100
1916	108.4	108.9	108.7	111.8	111.8	111	117.2	111	120	101 5	102	101.5
1917	129.0	127.7	131.3	143.1	143.1	146	143.8	133	143	105	101	105
1918	150.0	156.5	152.2	164.7	164.7	162	178.3	179	177	115	105	115
1919		175.2	172.2	182.3	182.3	190		214	200	128	114	128
1920		214.0	204.5			219		286	266	158	135	158

Year	Fuel and Light			House Furnishings			Miscellaneous		
	N.B.E.R.[h]	B. of L.[de]	N.I.C.B.[a]	N.B.E.R.[h]	B. of L.[de]	N.I.C.B.[a]	N.B.E.R.[h]	B. of L.[de]	N.I.C.B.[ba]
1909	98.6			83.4			102.4		
1910	98.7			87.9			102.0		
1911	98.5			89.2			104.6		
1912	98.2			92.0			99.1		
1913	102.7	99		93.2	97	Included	96.3	99	
1914	100.0	100	100	100.0	100	under Miscellaneous	100.0	100	100
1915	97.9	100	102	100.8	104		95.6	103	100
1916	99.3	103	104	116.5	116		100.5	108	104
1917	111.6	116	126	131.7	135		111.5	125	117
1918	119.8	136	135	158.4	178		128.4	151	150
1919	131.4	145	142		221			171	163
1920		171	166		287			198	185

[a] National Industrial Conference Board; *Changes in the Cost of Living, July 1914–July, 1920*, p. 27. Data for July of each year.
[b] Includes House Furnishings.
[c] Average for year adjusted to base 1914.
[d] United States Bureau of Labor, Data from *Monthly Labor Review*.
[e] Adjusted by aid of curve to middle of year and base 1914. Data from *Monthly Labor Review*, October, 1920, p. 65.
[f] Assumed.
[g] For middle of year; adjusted to base 1914; *Monthly Labor Review*, June, 1920, p. 79, and October, 1920, p. 65.
[h] National Bureau of Economic Research; indices computed for middle of year.

Since the facilities of the United States Bureau of Labor Statistics are so much more extensive than any at the command of this Bureau, it seems fair to assume that their index number is the better one to follow for the period actually covered, and hence, in the practical application of the index number for the purpose of reducing the book income of the working classes to terms of purchasing power, the index number shown in Table 2C is the one which will actually be used. This is simply the Bureau of Labor Statistics index carried backward to 1909 by assuming that, for the earlier years, it varies in the same ratio as the index for all consumption goods shown in the first column of Table 2B.

TABLE 2C

A COMPOSITE INDEX NUMBER SHOWING THE AVERAGE PRICES OF CONSUMPTION GOODS USED BY MANUAL AND CLERICAL WORKERS, THE INDEX BEING BASED UPON INVESTIGATIONS BY THE UNITED STATES BUREAU OF LABOR AND THE NATIONAL BUREAU OF ECONOMIC RESEARCH

Middle of Year	Index of Average Retail Prices Base 1913
1909	95.5[a]
1910	97.8[a]
1911	98.4[a]
1912	99.4[a]
1913	100. [b]
1914	101. [b]
1915	103. [b]
1916	110. [b]
1917	129. [b]
1918	158. [b]
1919	177.3[c]
1920	216.5[c]

[a] National Bureau of Economic Research; derived from Table 2B.
[b] U. S. Bureau of Labor, *Monthly Labor Review*, June, 1920, p. 79.
[c] U. S. Bureau of Labor, *Monthly Labor Review*, October, 1920, p. 65.

The more complete data are presented in the hope that they may be of assistance to other workers in this field.

§ 2c. Price Indices of Consumption Goods Used by the Well-to-do Classes

Many studies have been made of the changes that have occurred in the prices of consumption goods bought by the "working people," but this Bureau has not succeeded in discovering any index showing variations in the prices of those commodities consumed by the wealthier classes. Yet,

in any study of the changes in the relative welfare of the different sections of the population, it is, of course, imperative that such an index be available, especially in times of rapidly shifting price levels when quantities shown in terms of money value are almost meaningless. With the hope of filling the gap in the available statistics along this line, the computation of an index of the above mentioned type was undertaken.

It was found that the most feasible form of procedure was first to obtain relative prices for a number of specific classes of commodities and then to compute therefrom a weighted arithmetic average index number, using as constant weights the relative expenditures in a given year for each class of articles. The first problem, then, was to estimate the proportion of expenditures going for each purpose.

Recently, the Federal Reserve Board made a study of the apportionment of income made by its employees. The relative distribution there shown differs somewhat from that known to exist for wage workers. It therefore seemed reasonable to suppose that the apportionment of their expenditures by persons having still higher incomes would diverge still more widely from that of the wage earners. With a view to obtaining a little more light on the question, a number of persons of means were requested by the present investigator to state their views as to the respective shares of income which were, in general, spent by families having total expenditures solely for consumption goods amounting to $5,000, $10,000, $20,000, and $50,000, for

1. Food for themselves and servants.
2. Clothing.
3. Fuel and light.
4. Housing, including an estimated rent for a residence occupied by the owner.
5. Money wages of servants.
6. Automobiles and yachts, including maintenance and depreciation.
7. All other purposes.

Only about a dozen of the replies received were in a form which answered the requirements. However, from even this limited number, it is possible to discern, as total expenditures change, certain rather definite trends in the percentages of income spent for the specified purposes. From these indications, curves were plotted for each of the various groups, and such adjustments were made as were necessary to bring the totals to unity. The final estimates appear in Table 2D.

TABLE 2D

AN ESTIMATE OF THE PERCENTAGES OF TOTAL EXPENDITURES FOR CONSUMPTION GOODS MADE FOR THE PURPOSES SPECIFIED

Estimate based on Study by Federal Reserve Board of Expenditures of Its Employees and upon Replies to a Few Questionnaires Submitted by this Bureau

Total expenditures annually for consumption goods	Total of per cents	Food for family, guests and servants	Housing, including rent of homes owned	Fuel and light	Automobiles, yachts and their maintenance	Wages of servants	Clothing	Miscellaneous, including house furnishings
$ 5,000	100.0	27.2	18.0	3.3	9.2	4.5	14.3	23.5
10,000	100.0	19.2	18.3	3.2	9.8	9.5	11.9	28.1
15,000	100.0	15.8	18.6	3.0	10.0	11.5	10.3	30.8
20,000	100.0	13.7	18.9	2.8	10.0	12.3	9.3	33.0
25,000	100.0	12.0	19.2	2.6	10.0	12.7	8.7	34.8
30,000	100.0	10.4	19.5	2.4	10.0	12.9	8.1	36.7
35,000	100.0	9.1	19.8	2.2	10.0	13.1	7.6	38.2
40,000	100.0	7.9	20.1	2.1	10.0	13.3	7.1	39.5
45,000	100.0	6.9	20.4	1.9	10.0	13.5	6.7	40.6
50,000	100.0	6.1	20.7	1.8	10.0	13.7	6.4	41.3

Were the weights the most vital factor in determining the trend of the prices under consideration, it would be sheer folly to trust an estimate based upon such scanty data as those upon which the tables just presented rest. However, it is a well-known fact that prices of different classes of commodities do not move in entirely independent paths but fluctuate in somewhat similar ways at the same time. Since this is true, it follows that even a large change in the weights is likely to produce no radical effect upon the average index. Hence, if the above estimates are even approximately correct, there is no reason for believing that they will not serve well enough as weights for the purpose intended.

Our particular needs require an index applicable to groups of persons who receive incomes from property. The industries of transportation, manufacturing, and mining are largely operated by corporations and the owners receive their income therefrom mainly in the form of dividends or bond interest. It appears from the *Statistics of Income* for 1917, published by the Bureau of Internal Revenue, that the median net income of those receiving corporate dividends is around $25,000. Since that date, prices and incomes have increased materially, and it appears probable that today a family of the same social class would receive enough more income to enable them to spend $25,000 for consumption goods in addition to what savings they would make. For these particular industries, it seems best, therefore, in computing an index for the purpose of reducing the money income of the propertied classes to a basis of constant purchasing power, to use the

weights indicated in Table 2D as applicable to the $25,000 class. When, however, certain other industries are considered, it is evident that the average entrepreneur does not have an income in any way approximating that of the average owner of the stock of the corporations controlling the highly organized fields. Nevertheless, these people may be sufficiently wealthy to cause their expenditures to differ materially in their distribution from those of the working classes. For the propertied classes deriving their livelihood from such industries, it seems probable that the weights based upon average expenditures of $5,000 per annum are more appropriate. The relative prices shown in Table 2E have therefore been multiplied by the weights representing the $5,000 class, and the weighted average index thus derived is shown in Table 2G.

The division of expenditures shown in Table 2D is not carried far enough to furnish an appropriate weight for each of the relative prices actually available. It has been necessary, therefore, to subdivide some of the original groups of commodities in order to arrive at the weights used in Tables 2E and 2F. This process of subdivision has perforce been based upon rough estimates, as no accurate information on the subject has been discovered.

Price data are available only for certain classes of expenditures, hence these classes have necessarily been used as typical of all articles or services purchased. The price estimates have been collected from a variety of sources and have been computed with considerable care except in the case of a few relatively unimportant items. In one or two items such as, for example, automobile repairing, the estimates are only moderately accurate, but they are the best obtainable.

For the groups entitled "Food," "Clothing," "House Furnishings," "Fuel and Light," and "Housing," the same indices have been used that were computed for the same groups of goods used by the laboring classes. It is, of course, true that the articles purchased by the wealthy in the way of clothing, housing, and house furnishings, are of a very different quality than are those used by the poorer classes. No reason is apparent, however, why the higher priced articles should on the average, vary in a fashion much different from that characteristic of the cheaper goods. In the absence of any definite knowledge concerning this matter, and in view of the paucity of data, it was felt that it would be a useless expenditure of effort to attempt to make the indices specified fit more closely the prices of goods bought by the wealthier classes only.

The data upon which several of the price indices for the minor groups are based are too heterogeneous and irregular to give one great confidence in their accuracy.

For the reasons just stated, it is clear that the final average index must

THE DERIVATION OF AN INDEX SHOWING THE VARIATIONS IN THE AVERAGE PRICES OF CONSUMPTION GOODS PURCHASED BY FAMILIES OF THE CLASS SPENDING $25,000 THEREON IN 1919

Relative price based on that in 1914 equalling 100.0

Weights	100.0	15.0	10.9	8.0	3.2	23.9	15.8	2.0	0.1	0.5	2.5	2.5	2.5	5.0
Year	Weighted average index; Base 1913	Food [a]	Clothing [b]	House furnishings [b]	Fuel and light [c]	Housing	Servants' wages [f]	Passenger fares [g]	Telephone rates [h]	Street car fares [i]	Automobile repairs [j]	Automobile tires [k]	Gasoline [l]	Automobiles [m]
1909	97.3	87.2	90.7	82.3	98.6	100.0 [d]	94.5	97.4	107.1	97.9	156.5	82.4	105.7	119.0
1910	98.8	91.2	95.0	88.1	98.7	100.0 [d]	94.8	98.5	105.6	98.5	153.6	90.3	98.6	115.4
1911	99.5	90.2	98.4	88.3	98.5	100.0 [d]	95.0	99.7	104.1	98.9	171.9	97.3	96.4	110.5
1912	100.0	96.1	98.8	91.4	98.2	100.0 [d]	96.7	100.6	102.6	99.4	118.0	131.5	102.1	103.7
1913	100.0	98.0	97.0	92.4	102.7	100.0 [d]	97.6	100.6	101.5	99.6	95.7	109.1	120.0	103.8
1914	101.0	100.0	100.0	100.0	100.0	100.0 [e]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1915	99.6	99.0	102.7	98.8	97.9	100.0 [e]	105.1	100.6	99.0	100.4	75.0	74.3	85.7	89.6
1916	107.4	111.8	111.0	118.1	99.3	101.9 [e]	109.7	103.1	98.4	100.8	44.9	79.2	171.4	85.0
1917	119.8	143.1	128.9	132.4	111.6	105.0 [e]	118.6	105.3	97.4	101.3	51.8	98.8	171.4	89.4
1918	136.4	164.7	162.3	160.9	119.8	117.5 [e]	126.5	121.7	96.9	101.6	60.6	116.6	172.1	94.8
1919	162.8	182.3	200.5	184.3	131.4	129.3 [e]	141.8	151.2	107.1	101.9	67.8	270.8	175.0	106.7

[a] U. S. *Monthly Labor Review*, August, 1920, pp. 51–53.

[b] Computed from quotations from the catalogues of Sears, Roebuck & Co. Weights based on Bureau of Labor Statistics study in the *Monthly Labor Review*, November, 1919, pp. 2–14, and January, 1920, pp. 27–34.

[c] Based on data in the *Statistical Abstract of the U. S.*, 1915, p. 531, the U. S. *Monthly Labor Review*, March, 1920, p. 63, and reports of the N. Y. City Edison Co. Include bituminous and anthracite coal, electricity and gas.

[d] No information for these years.

[e] Taken from *Research Report No. 28* of the National Industrial Conference Board, May, 1920.

[f] A weighted average of the wages of Laundry Workers, Watchmen, Cooks and Housemaids, Janitors, Chauffeurs, Matrons, and Stewards; data from U. S. Bureau of Labor Statistics, U. S. and State Civil Service reports, newspapers, etc.

[g] Quoted in *The Financial Review;* adjusted to calendar years.

[h] Based upon rough estimates made by Colonel M. C. Rorty of the American Telephone & Telegraph Co.

[i] Interpolated, by aid of a smooth curve, between the figures given in the United States *Census of Street and Electric Railways* for 1907, 1912, and 1917.

TABLE 2E—*Continued*

THE DERIVATION OF AN INDEX SHOWING THE VARIATIONS IN THE AVERAGE PRICES OF CONSUMPTION GOODS PURCHASED BY FAMILIES OF THE CLASS SPENDING $25,000 THEREON IN 1919

Weights	0.5	0.1	0.1	0.4	1.4	3.0	1.1	1.5	100.0
Year	Moving pictures [n]	Newspapers [o]	Magazines [o]	College tuition [p]	College room and board [p]	Hotel rates [q]	Tobacco [r]	Theaters [s]	Weighted average index; Base 1914
1909	50.0	99.4	111.9	100.0	100.0	100.0	100.5	90.0	96.4
1910	50.0	99.4	111.9	100.0	100.0	100.0	99.7	100.0	97.9
1911	50.0	98.5	113.8	100.0	100.0	100.0	99.8	100.0	98.5
1912	50.0	98.5	121.9	100.0	100.0	100.0	99.8	100.0	99.1
1913	50.0	101.2	118.8	100.0	100.0	100.0	99.6	100.0	99.1
1914	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1915	100.0	99.5	100.6	100.0	100.0	100.0	101.6	100.0	98.7
1916	150.0	99.5	100.6	100.0	100.0	100.0	103.6	100.0	106.4
1917	200.0	104.5	100.0	120.0	105.8	120.0	120.4	100.0	118.6
1918	250.0	115.4	100.0	120.0	116.4	140.0	163.5	119.0	135.0
1919	250.0	122.6	115.7	130.9	124.7	175.0	181.6	150.0	161.2

[j] Estimated as average repair cost per car—according to special study.

[k] From *History of Prices During the War* edited by Wesley C. Mitchell for the War Industries Board and from advertisements of tires in the *Motor Age*.

[l] Computed from wholesale prices given in *Dun's Review* and the *Statistical Abstract of the U. S.*: retail prices not available.

[m] An index of the prices of large pleasure cars computed from the data given in the annual *Handbooks of Automobiles* published by the National Automobile Chamber of Commerce. Same sizes of cars compared for all years.

[n] Could not locate accurate data; roughly estimated.

[o] Computed from prices in N. W. Ayer's *Annual Directory*.

[p] Calculated from figures in annual catalogues of leading American colleges and universities.

[q] Based upon rates quoted in the annual hotel directories for the United States.

[r] Information for earlier years derived from U. S. Bureau of Labor Statistics, *Bulletin 181*, p. 235; War Industries Board, Bulletin on *Tobacco and Tobacco Products;* and the *Yearbook* of U. S. Department of Agriculture; and for later years from information furnished by the American Tobacco Co. The earlier indices are based on wholesale prices, no retail quotations being discovered.

[s] Estimated from newspaper advertisements and from information furnished by Mr. McBride of the McBride Ticket Agency of New York City.

be regarded as but a crude approximation to the truth. It seems to be established, however, that the prices of commodities bought by the wealthier classes did not rise quite as sharply during 1917, 1918, and 1919 as did the prices of those articles consumed by the poorer fraction of our population.* It is believed that the indices shown in Table 2E will at least serve somewhat better in reducing the money income of the wealthy to terms of purchasing power than would the Bureau of Labor Statistics index of the "cost of living" of the working classes and distinctly better than would any index of wholesale prices. Of course neither of the latter types of indices have been devised for this purpose, and hence cannot be expected to give satisfactory results if thus misapplied.

The tables on pp. 28 to 31 summarize the results obtained.

TABLE 2F

WEIGHTS USED IN COMPUTING THE INDEX OF PRICES OF COMMODITIES CONSUMED BY PERSONS SPENDING $5,000 ANNUALLY FOR CONSUMPTION GOODS

Automobiles	4.0
Automobile Repairs	2.1
Automobile Tires	2.0
Clothing	15.8
College Room and Board	1.1
College Tuition	0.4
Food	30.0
Fuel and Light	3.6
Gasoline	2.0
House Furnishings	6.1
Housing	19.9
Hotel Bills	0.7
Magazines	0.3
Moving Picture Shows	1.2
Newspapers	0.4
Railway Passenger Fares	2.2
Servants' Wages	5.0
Street Car Fares	0.8
Telephones	0.6
Theatre Seats	0.9
Tobacco	0.9
Total	100.0

TABLE 2G

A COMPARISON OF THE ESTIMATED INDICES OF THE AVERAGE PRICES OF CONSUMPTION GOODS USED BY DIFFERENT CLASSES OF THE POPULATION OF THE CONTINENTAL UNITED STATES

Middle of the Year	Indices [c] of Prices of Consumption Goods Used by		
	Manual and clerical workers' families [a]	Families spending $5,000 per annum on consumption goods	Families spending $25,000 per annum on consumption goods [b]
1909	.955	.956	.973
1910	.978	.977	.988
1911	.984	.984	.995
1912	.994	.999	1.000
1913	1.00	1.000	1.000
1914	1.01	1.013	1.010
1915	1.03	1.002	.996
1916	1.10	1.088	1.074
1917	1.29	1.252	1.198
1918	1.58	1.448	1.364
1919	1.773	1.669	1.628
1920	2.165		

[a] See Table 2C; indices divided by 100.
[b] See Table 2E; indices divided by index shown there for 1913.
[c] Prices of 1913 = 1.000

§ 2d. An Estimate of the Industrial Distribution of the Gainfully Employed Persons in the Continental United States

I. The Total

The total number of gainfully employed in the United States as reported by the Census of Occupations includes a large number of farmers' wives and children who do a certain amount of agricultural work on the home farm.

Nearly all members of farmers' families do some work on the home farm or in the house and how many of them should be regarded as "gainfully employed" is hard to say. The proportion so reported has varied from one census to the next with the wording of the instructions and from one district to another at every census with the interpretation put upon their instructions by different enumerators. Hence the figures for farmers' wives and children at work on the home farm have no consistent meaning, and this item in the classification of occupations has been excluded from all the following estimates.

The ratio of the number of remaining male workers to the total population has been calculated for each Census year and the curve obtained by

plotting these figures has been carried forward from 1910 to 1918, an allowance being made for the practical cessation of immigration during the war years and for the addition in 1918 of a considerable number of school boys to the list of gainfully employed. By using the ratios obtained from this curve as multipliers, products have been obtained which probably approximate the numbers of males gainfully employed in each year.

For a few industries, it has been possible to obtain annual ratios of the number of females to the number of male employees. These ratios have been adjusted to conform to the Census ratios for all industries in the Census years. In the intervening years the numbers of male workers have been multiplied by the adjusted ratios in order to obtain an estimate for each year of the number of females working for gain. The addition of the estimated number of females to the number of males, of course, gives the figures for the total number of persons gainfully employed.

This number is evidently composed of entrepreneurs [1] and employees. The procedure adopted has been to estimate the number of the former and subtract it from the total in order to obtain the number working for wages or salaries. The final results appear in the three top lines of Table 2J.

II. Entrepreneurs

Any estimate of the number of entrepreneurs in the various industrial fields must be based primarily upon the reports of the United States Census since State Reports seldom throw any light upon the matter. The Census classifies the gainfully employed only by occupations but these figures have been used as the basis of careful though necessarily somewhat inaccurate estimates of the number of entrepreneurs in each industry. In most instances, the occupation of an entrepreneur indicates the industrial field to which he is to be assigned, hence the occupational classification is reasonably satisfactory for the purpose at hand. For a number of important industries such as mining, manufacturing, and agriculture, the reports for the separate industries record the number of entrepreneurs in each. The estimates for the other industrial fields have been based upon the Census of Occupations. The estimates thus made for the various occupations have been added to obtain the probable numbers engaged in all occupations in the Census years. The respective ratios of the number of entrepreneurs to the total population have been plotted for the various Census years and the curve thus obtained has been projected to 1920. By applying the ratios read from this projected curve to the estimated

[1] The word "entrepreneur" is used in the customary sense—namely, as a person conducting a business at his own risk. Lawyers, peddlers, merchants, farmers, and independent manufacturers are typical entrepreneurs. Managerial employees are not included under this term.

populations for the other years, products have been obtained which are believed to represent with some approach to the truth the total number of entrepreneurs in each of the intercensal years. The estimates for the years since 1910 have been strengthened by the figures in the Censuses of Manufactures for 1914 and 1919, in the Censuses of the Electrical Industries for 1912 and 1917, and in the Census of Agriculture for 1919. Since the Census of Occupations for 1920 has not yet been published, it has been necessary to assume that the apportionment of the remaining number of entrepreneurs among the other industries has remained relatively the same as in 1909.

TABLE 2H

AN ESTIMATE OF THE NUMBER OF ENTREPRENEURS NORMALLY OCCUPIED IN THE PRINCIPAL INDUSTRIAL FIELDS

Industry	Thousands Attached to the Industry in the Year											
	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
All industries	9,550	9,617	9,648	9,679	9,710	9,743	9,746	9,737	9,752	9,757	9,760	9,758
Agriculture	6,330	6,362	6,376	6,388	6,400	6,410	6,418	6,425	6,432	6,438	6,443	6,448
Mining	35	34	33	32	31	30	29	29	28	27	26	26
Laundry	16	20	25	30	34	34	34	35	36	36	36	37
Construction	175	174	170	170	165	155	145	135	130	120	130	120
Hand trades	228	230	231	233	235	237	239	239	244	244	254	263
Factory	273	272	270	268	252	263	260	256	253	250	246	242
Transportation	29	29	29	29	29	28	28	28	28	28	28	28
Banking	4	4	4	4	4	4	4	4	4	4	4	4
Unclassified industries	2,460	2,492	2,510	2,525	2,560	2,582	2,589	2,586	2,597	2,610	2,593	2,590

III. Employees

In estimating the number of employees in a given industry, it is necessary to distinguish sharply between the number of persons actually at work in the field and the number of persons attached to the industry. At all times, some of the persons normally making their living by any given line of effort are not at their usual tasks. Fortunately for the accuracy of our computations, the fraction of all employees not at work is usually too small to affect the results materially, but, in times of business depression, the percentage may run very high and the effects then become of great moment.

It is usually necessary to determine average annual earnings by dividing the total of wages paid by the total number of employees attached to the industry. It is sometimes only possible to estimate the average number of employees actually working in a given field by dividing the total wage bill by a reported average wage for the period. Evidently then, the questions of wage rates and numbers of persons employed are so closely interlocked that both must be studied together if an intelligent view of the entire situation is to be obtained.

For each of several important fields of industry, the Census Bureau and the Interstate Commerce Commission state the average [1] number of persons employed and the total amount paid to those persons in salaries and wages. At first thought, it might seem that the division of the amount paid by the average number of employees would show the actual amount paid each employee. A little computation will, however, make it clear that the quotient actually represents approximately the average wage received by an employee who worked constantly during the period designated by his employer as "full time."

This rule is necessarily modified somewhat by the existence of fractional days of work and by overtime. If, for example, John Jones works in the forenoon and Wm. Smith in the afternoon of a given day, the chances are that both will appear on the payroll and hence will be counted as two men. If each received $2.00 for his work, only $4.00 is paid out. But $4.00 divided between 2 men gives only $2.00 each which is only half the full-time daily wage.

The only large industry in which the fractional day seems to be common enough to be of serious import is that of coal mining. In this field fractional time seems to be almost the rule; hence the average wage for miners obtained by dividing the total wage bill by the reported average number of workers gives a quotient representing the average wage for a day much shorter than the nominal full-time day in the mines.

In most industries, the error due to the presence of workers employed for fractional days is probably offset almost entirely by the fact that many of the men work longer than the standard number of hours. If, for example, Richard Roe puts in three hours overtime and makes $6.00 instead of the regular $4.00 per day, he is still counted as one man and hence the quotient is distinctly larger than the normal full-time daily wage.

The result obtained, therefore, by dividing the recorded amounts paid by the recorded number of workers usually represents the average amount received by a worker who appeared for work every regular work day but who missed the average number of fractional days and who put in the average amount of overtime. Since in most industries, as just stated, the amount of overtime probably about balances the time lost through absences of a part of a day, the hypothetical average employee just referred to probably earns in the long run approximately the same amount [2] as the one who puts in the nominal full-time day. Nevertheless, owing to the nature of the data at hand, it follows that whenever a difference exists, it is the hypothetical average employee rather than the one conforming

[1] The Census computes the average number by adding together the totals actually reported for the 15th day of each month and dividing by twelve the sum thus obtained.

[2] In busy times, he would put in overtime and earn more; in slack times the reverse would be true

to the standard length of working day announced by the employer, who must, for the purposes of this investigation, be considered a full-time worker.

It is evident, on the basis of the definition just stated, that although a minority of employees will earn more than the full-time wage because they miss fewer than the average number of fractional days or because they put in over-time, far greater numbers will earn less than the full-time wage because there will be many days when, on account of sickness, desire for leisure, personal business matter, or lack of available work, their names will not appear on the payroll. It follows then that the average wage, as shown by the quotient obtained by dividing the amount paid by the average number of employees, is, as a rule, distinctly larger than the average received by the employees who normally obtain a livelihood by working in the given industry.

From the point of view of production costs, the directly computed average, (which represents full-time earnings,) may be satisfactory, but it certainly will not answer if the aim is to picture the average labor income of the employees. In a year when many of the workers are idle for two or three months, there will occur a striking diminution in the total demand for necessities or customary luxuries even though the figures show that the average full-time wage has undergone no decline.[1] A necessary prerequisite, therefore, to measuring the income from wages received by the average person who normally is employed in an industry is the computation for each year of a fraction representing the ratio of the number of days actually worked by the average employee to the number of days put in by the hypothetical "full-time" worker.

The computation of such a fraction or ratio is fraught with great difficulties, for practically no extensive data exist which show with any degree of reliability the amount of unemployment in the various industries for any year, to say nothing of the fact that there are available no records comparing the various years of the decade which we are studying.

The United States Census Bureau attempted in 1890 and again in 1900 to secure information in this connection, but the method used had two serious defects: First, inquiry was made as to the number of months or parts of months unemployed, and since it is an obvious fact that thousands of persons are absent from work during many days of the year, yet seldom consecutively for any considerable fraction of a month, it appears certain that many of those recorded as full-time workers were really unemployed for an aggregate of time not at all negligible; second, the period covered

[1] If, for example, the Census wage total is divided by the Census average number employed the resulting quotients will show no decline as long as wage rates remain constant, even if half the workers are unemployed.

by the inquiry was a whole year, and experience demonstrates that the ordinary informant's memory is too poor to enable him to give much information, even for himself, to say nothing of other members of the family, concerning brief periods of unemployment occurring several months before. Under these circumstances, it seems safe to use the Census figures only as relative and not as absolute measures of unemployment.

The basic data upon which all the estimates are superimposed are the records of the number of workers employed in Massachusetts factories.[1] At first thought, it seems absurd to place such a large superstructure upon such a narrow foundation, but a careful study of such other employment records as are available indicates that variations in Massachusetts employment are distinctly typical of those in manufacturing throughout the United States and that these cyclical fluctuations in employment in manufacturing are similar in a large measure to those characterizing conditions in other industrial fields. The Massachusetts records have been compiled for many years and have all the earmarks of statistical accuracy, two characteristics which make them unique in this field as far as the United States is concerned.

The fundamental assumption in the present study is that workers do not tend to shift rapidly from one branch of industry to another. If this assumption is true it follows that a curve representing the number of employees depending for a living upon a great industry like manufacturing will show no sharp breaks or irregularities. A further hypothesis which accords with the views of Mr. Hornell Hart as expressed in his monograph on "Fluctuations in Unemployment in Cities of the United States" is that in times when wages in any line of enterprise are very high, that industry may attract to itself a number of persons not normally working for wages; for example, school boys and girls, women and girls normally performing only household duties, and casual independent workers such as agents, peddlers, shop keepers and mechanics. The addition of such persons tends to produce bumps on the curve representing the total number of employees attached to all industries, a curve which would otherwise be nearly smooth. For example, during 1917 and 1918, the aggregate number of persons receiving salaries and wages was doubtless noticeably increased by the addition of boys who left school to join the army and of women and girls who, for patriotic reasons, sought employment which they believed would help win the war.

The Census Bureau in 1890 and also 1900 enumerated on the basis of family statements the number of persons who were unemployed in the

[1] It is impossible to calculate from these figures the absolute numbers unemployed for we do not know how many have found work outside the manufacturing field. The data are then useful only as measures of relative employment.

preceding year and classified the unemployment into the periods one to three months, four to six months, and seven to twelve months. The ratio of the per cent of the workers in each industry unemployed for each of these periods to the per cent of Massachusetts factory workers shown by the Census to be unemployed for the same length of time was computed by this Bureau. For each industry, six ratios were thus obtained, three for each of the two Censuses. The six ratios were then averaged and these averages were recorded.

The next step was to multiply the actual per cent of unemployment in Massachusetts factories as estimated from the State *Statistics of Manufactures* for the various years by the average ratios just described. The resulting products were the preliminary estimates of the per cents of unemployment in each of the different industries in the various years of the decade. The remainders obtained by subtracting each of these per cents from 100 were assumed to represent the ratio of the number of those actually at work to the number of persons attached to the industry—that is, normally making their living in this field of endeavor.

The records most commonly available show the average number actually working in a specified industry. The procedure followed here is to divide these average numbers by the tentative ratios just mentioned in order to obtain a preliminary estimate of the number of employees attached to each of the respective industries. Since it has been assumed that the number attached to any large industry as a rule varies slowly and regularly, the original figures have been plotted as historigrams and these curves have been smoothed. From the smooth curves thus obtained, numbers have been read which are assumed to represent approximately the number of employees attached to each industry in each year. The resulting numbers and the ratios derived by dividing the number actually at work by the estimated number attached to the industry are shown in Tables 2I, 2J, and 2K.

After the numbers of employees had been computed for each of the industries in which records are available, these numbers were summated for each of the various years. The total number of employees had already been calculated by a method described on a previous page. It was, then, only necessary to subtract the total number of employees in the recorded industries from the total number in all industries in order to arrive at the estimated number in the unclassified industries, an estimate shown in the next to the last line of Table 2J. This step completed the classification of the gainfully employed in so far as necessary for this study.

TABLE 2I

AN ESTIMATE OF THE AVERAGE NUMBER OF EMPLOYEES ACTUALLY AT WORK IN CERTAIN OF THE PRINCIPAL INDUSTRIAL FIELDS OF THE CONTINENTAL UNITED STATES

Industry	Thousands at Work in the Year									
	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Laundry	140	155	159	169	185	175	173	179	168	155
Construction	1,516	1,456	1,368	1,459	1,538	1,116	1,054	1,147	1,000	726
Hand trades[a]	389	395	411	409	408	476	471	428	487	558
Factory[b]	7,405	7,370	7,500	7,930	8,000	8,001	7,993	9,457	10,140	10,480
Steam railway[c]	1,641	1,742	1,750	1,818	1,815	1,605	1,575	1,744	1,834	1,937
Pullman	14	15	15	15	21	20	19	20	19	19
Express	57	62	64	68	68	64	64	72	84	88
Transportation by water	208	212	216	224	230	225	232	237	239	254
Street railways	252	266	274	282	284	278	276	292	295	292
Telephone	143	159	180	194	214	215	208	237	263	278
Telegraph	31	33	35	38	39	39	41	48	52	56

[a] Includes automobile repairing, blacksmithing, tailoring, dressmaking, millinery, shoe repairing, custom grist and saw mills, and other similar minor industries.
[b] Includes lumbering and gas manufacture. [c] Includes switching and terminal companies.

TABLE 2J

AN ESTIMATE OF THE TOTAL NUMBER OF GAINFULLY EMPLOYED[g] AND OF THE AVERAGE NUMBER OF EMPLOYEES ATTACHED TO EACH OF THE PRINCIPAL INDUSTRIES OF THE CONTINENTAL UNITED STATES

Industry	Thousands of employees in the year									
	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Total Gainfully Employed[g]	33,910	34,858	35,581	36,282	37,101	37,252	37,522	38,101	38,681	39,981
Total Entrepren'rs[f]	9,550	9,617	9,648	9,679	9,710	9,743	9,746	9,737	9,752	9,757
Total Employees[g]	24,360	25,241	25,933	26,603	27,391	27,509	27,776	28,364	28,929	30,224
Employees by Industries, Agriculture[e]	2,376	2,379	2,388	2,390	2,394	2,393	2,382	2,373	2,288	2,121
Mining	1,073	1,106	1,132	1,150	1,159	1,163	1,163	1,154	1,141	1,108
Laundry	150	161	172	181	194	193	190	185	174	161
Construction	1,585	1,600	1,619	1,617	1,608	1,427	1,292	1,194	1,026	757
Hand trades[a]	410	421	425	432	446	487	490	481	495	572
Factory[c]	7,730	7,810	7,970	8,190	8,430	8,790	9,102	9,757	10,395	10 9.5
Commercial electric light & power	55	61	67	73	79	84	89	94	98	102
Steam railway[b]	1,705	1,775	1,818	1,834	1,836	1,838	1,840	1,842	1,856	1,958
Pullman	14	15	16	16	21	22	21	20	20	19
Express	59	63	66	69	71	72	73	76	85	89
Transportation by water	224	231	239	243	248	250	252	253	256	275
Street railway	260	272	282	289	293	295	297	298	299	300
Telephone	150	163	185	205	218	226	230	242	267	285
Telegraph	32	34	37	40	41	42	44	47	53	58
Banking	150	154	162	168	173	178	180	183	186	193
Unclassified industries & professions	6,823	7,376	7,685	7,980	8,397	8,183	8,175	8,122	7,600	6,194
Government[d]	1,565	1,620	1,671	1,727	1,785	1,866	1,955	2,037	2,691	5,129

[a] Includes automobile repairing, blacksmithing, tailoring, dressmaking, millinery, shoe repairing, custom grist and saw mills, and other similar minor industries.
[b] Includes switching and terminal companies.
[c] Includes lumbering and gas manufacture.
[d] Federal, state, and local, including the army and navy, public schools and government owned industries.
[e] Includes stock raising, market gardening, etc. [f] See Table 2H.
[g] Members of the family assisting their parents on the home farms are not included among the gainfully employed for purposes of this study.

TABLE 2K

AN ESTIMATE OF THE RATIO OF THE AVERAGE NUMBER OF EMPLOYEES AT WORK TO THE AVERAGE NUMBER OF EMPLOYEES ATTACHED TO EACH OF CERTAIN LEADING INDUSTRIAL FIELDS IN THE CONTINENTAL UNITED STATES

Industry	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Automobile repair	.962	.980	.932	.944	.927	.975	.978	.939	.973	.980
Laundry	.935	.963	.924	.931	.958	.905	.911	.966	.971	.970
Construction	.957	.910	.845	.902	.956	.782	.816	.960	.975	.959
Other hand trades[a]	.947	.931	.974	.947	.912	.978	.957	.873	.918	.975
Factory[b]	.958	.944	.941	.968	.949	.910	.878	.969	.975	.961
Steam railway[c]	.962	.981	.963	.990	.988	.873	.856	.947	.988	.989
Pullman	.962	.982	.969	.953	.979	.935	.904	.975	.979	.984
Express	.963	.985	.963	.985	.968	.887	.869	.948	.989	.989
Transportation by water	.927	.917	.906	.919	.930	.899	.922	.936	.934	.925
Street railways	.968	.977	.970	.978	.971	.943	.929	.982	.986	.977
Telephones	.957	.974	.970	.949	.983	.952	.904	.980	.982	.975
Telegraphs	.964	.964	.967	.968	.950	.943	.933	.975	.979	.971

[a] Includes blacksmithing, tailoring, dressmaking, millinery, shoe repairing, custom grist and saw mills, and other similar minor industries.
[b] Includes lumbering and gas manufacture.
[c] Includes switching and terminal companies.

CHAPTER 3

AGRICULTURE [1]

§ 3a. Sources of Information

The statistics utilized in this field are derived mainly from the Census and from the reports of the Department of Agriculture. As this is one of the largest of the nation's industries, it is fortunate that the data available are both abundant and reasonably reliable. Since, unfortunately, the returns for the Census of 1920 are not yet complete in some respects, it has been necessary in such instances to use the preliminary estimates for about half the States as bases for the 1919 statistics. In certain lines, the Census figures for the volume of production for 1919 are materially lower than are those of the Agricultural Department for the same year. Since the Census estimates are probably the more accurate, they have been relied upon in so far as possible. Even with the Census reports for twenty-three States still unavailable in some fields, it nevertheless appears probable that the percentage of error in the figures for this industry is lower than the like percentages for many of the other fields.

§ 3b. Method of Procedure

The method adopted in order to arrive at the net value product of the industry has been to deduct from the gross value product all payments to other industries for their goods or services used in agricultural production. The remainder represents the amount left as a reward for the services of persons or property devoted to the agricultural field. The general plan of procedure is illustrated by the following examples.

Nearly half of the total crop yield is fed to livestock. The remainder is either sold to outside purchasers or consumed by the farmers themselves. Both sales and consumption evidently form part of the net income of agriculture. In addition to crops, the agricultural industry turns out a great quantity of livestock products in the form of draft animals, milk cows, milk, butter, meat, eggs, honey, wool, and mohair. Farmers also contribute each year to the national income by bringing into a state of cultivation a large area of previously unimproved land.

Manifestly, however, this output cannot all be ascribed to the labors of agriculturalists alone; for, in order to keep up production, farmers must

[1] Drs. L. C. Gray and O. C. Stine of the U. S. Department of Agriculture have given very helpful suggestions which have been utilized in this chapter.

buy from other industries fertilizers, tools, machinery, automobiles, gasoline, harness, and saddles, and also a certain amount of bank credit and fire insurance. Payments for these articles and services must, therefore, be estimated and subtracted.

In certain years, farmers dispose of their livestock in large numbers, thus bringing in an increased money income, but at the expense of reduced inventories. Evidently, then, accuracy requires that account be taken of the diminution in inventories in figuring up actual production for the year.

§ 3c. The Value of Animal Products

With these fundamentals in mind, we can now proceed to analyze some of the more important items entering into the accounts of this field. Animal products may well be considered first. By combining the reports of the United States Department of Agriculture and the Food Administration, we are able to secure a complete estimate of the value of all meat obtained from the larger animals. This record appears in Table 3A.

TABLE 8A

THE VALUE OF THE LARGER DOMESTIC ANIMALS GROWN AND SLAUGHTERED IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G
Year	Estimated production in millions of pounds	Index of average meat prices to farmers	Index of total value meat produced (Millions) $\frac{B \times C}{100}$	Estimated total value to farmers of all animals slaughtered (Thousands)	Ratio of E to D	Estimated total value to farmers of all animals slaughtered (Millions) F × D
1909.....	19,752[a]	6.05[d]	1,195	$1,381,303[f]	1.156	$1,381
1910.....	17,390[c]	6.88[d]	1,196			1,382
1911.....	19,131[b]	5.74[d]	1,098			1,269
1912.....	18,249[b]	6.24[e]	1,138			1,314
1913.....	18,474[b]	7.03[e]	1,299			1,501
1914.....	17,706[b]	7.23[e]	1,280			1,480
1915.....	19,540[b]	6.64[e]	1,298			1,500
1916.....	21,030[b]	7.79[e]	1,638			1,892
1917.....	18,692[b]	11.52[e]	2,154			2,489
1918.....	22,337[b]	13.54[e]	3,025			3,497
1919.....	22,564[a]	13.87[d]	3,130			3,618
1920.....	21,000[g]	11.84[d]	2,487[g]			2,874[g]

[a] U. S. Dept. of Agriculture, *Monthly Crop Reporter*, March, 1919, p. 30, and March, 1920, p. 27.

[b] U. S. Food Administration, Stephen Chase, *Production of Meat in the United States*, p. 80.

[c] 0.91 of the 1911 amount, this being the ratio of the 1910 to the 1911 quantity of livestock shipped on railways as shown by the *Statistics of Railways*, published by the Interstate Commerce Commission.

[d] Extended back from 1912 and forward from 1918 on the basis of the tables in the *Monthly Crop Reporters* for March, 1920, p. 28, and February, 1921, p. 11.

[e] *Monthly Crop Reporter*, February, 1919, p. 19.

[f] From data in the *Census of Manufactures* for 1910, Vol. VIII, p. 380, and from the *Abstract of the Census* for 1910, pp. 356 and 478, it is possible to calculate that, in 1909, retail slaughter houses killed 4,088,000 beeves, 2,880,000 calves, 1,940,000 sheep and lambs, 3,970,000 hogs and 135,000 goats and miscellaneous animals. If the animals in each of these classes were on the average worth the same as the animals slaughtered on farms, their value was $178,636,000. Wholesale slaughterhouses paid farmers $960,726,000. From this amount should be deducted the $28,298,000, which is shown by the *Statistics of Railways* to have been paid as freight on livestock, leaving $932,428,000 as returns to farmers. In addition, the Census shows that farmers slaughtered animals worth some $270,239,000. The total value of meat animals to farmers therefore amounted to $1,381,303,000 in 1909. No allowance is made for profits to dealers and shippers, for it is assumed that the larger part of this class are themselves included by the Census under the heading of agriculture.

[g] Rough preliminary estimate.

Dairy products also form an important part of the output of American farms. In 1909, according to estimates based upon the *Abstract of the Census* of 1910, p. 344, the butter made on farms reporting dairy cows but

no dairy products amounted probably to about $16,530,000, in addition to the butter valued at $122,483,000, reported as used on farms. The Census also indicates that milk amounting in value to $158,700,000, was consumed on the farm as human food, making a total of $297,713,000, in dairy products used for sustenance by farmers and their families. This amount added to the $473,769,000, value of dairy products reported as sold by farmers gives $771,482,000, as the total value of dairy products consumed or sold off the farm by farmers in the year 1909. The method of making estimates for the intercensal years is outlined in Tables 3B and 3C.

TABLE 3B

AN ESTIMATE OF THE VALUE OF DAIRY PRODUCTS CONSUMED BY FARM FAMILIES IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F
Year	Index of price of dairy products [a]	Index of number of farms in the U. S.[b]	Index of total value of dairy products consumed by farmers B × C	Dairy products consumed by farm families in 1909 [c] (Thousands)	Estimated dairy products consumed by farm families (Millions) D × E
1909....	1.000	1.000	1.000	$297,713	$298
1910....	1.063	1.005	1.068		318
1911....	1.000	1.007	1.007		300
1912....	1.076	1.009	1.086		323
1913....	1.088	1.011	1.100		327
1914....	1.065	1.013	1.079		321
1915....	1.064	1.014	1.079		321
1916....	1.118	1.015	1.135		338
1917....	1.433	1.016	1.456		434
1918....	1.783	1.017	1.813		540
1919....	2.024	1.018	2.060		613
1920....	2.197	1.019	2.239		667

[a] A simple arithmetic average of the index for butter prices, (derived from the *Yearbooks* of the Dept. of Agriculture,) and the respective indices of retail and wholesale prices of milk as reported by the U. S. Bureau of Labor Statistics.

[b] Based on the U. S. Census reports for 1910 and 1920, numbers for the intermediate years being interpolated along a smooth curve.

[c] For mode of derivation, see the text.

TABLE 3C

AN ESTIMATE OF THE TOTAL AMOUNT OF DAIRY PRODUCTS SOLD BY FARMERS

A	B	C	D	E	F	G	H	I	J
Year	Estimated number of cows kept principally for milk [a] (Thousands)	Estimated number of cows whose products are marketed [b] (Thousands)	Preliminary index of total value of dairy products sold [c]	Value of whole milk and cream purchased by factories in census years (Thousands)	Ratio of E to D	Estimated value of whole milk and cream purchased by factories (Millions) D × F	Value of dairy products sold by farmers in census years (Thousands)	Ratio of H to G	Estimated value of dairy products sold by farmers (Millions) G × I
1909	17,010	10,680	10,680	$213,702 [d]	20.01 [f]	$214	$ 473,769 [h]	2.217 [f]	$ 474
1910	17,120	10,758	11,435		20.78 [g]	238		2.149 [g]	511
1911	17,300	10,924	10,924		21.52 [g]	235		2.083 [g]	490
1912	17,180	10,792	11,612		22.30 [g]	259		2.017 [g]	522
1913	17,000	10,600	11,532		23.11 [g]	266		1.952 [g]	520
1914	17,195	10,785	11,486	275,232 [d]	23.96 [f]	275		1.885 [g]	519
1915	17,645	11,227	11,946		24.82 [g]	297		1.819 [g]	540
1916	18,335	11,910	13,315		25.87 [g]	345		1.753 [g]	605
1917	19,000	12,568	18,010		26.89 [g]	484		1.687 [g]	816
1918	19,325	12,887	22,979		27.94 [g]	642		1.621 [g]	1,041
1919	19,490	13,047	26,407	770,624 [e]	29.18 [f]	771	1,199,300 [i]	1.556 [f]	1,199
1920	19,672	13,224	29,055		30.15 [g]	876		1.491 [g]	1,307

[a] Estimate based on Census for 1920, the assumption being that the number in earlier years varied in proportion to the number of dairy cows as estimated by the U. S. Dept. of Agriculture.

[b] Numbers in Column B less 1 cow for each farm allowed for supplying farm families and feeding calves.

[c] Numbers in Column C multiplied by the price indices of dairy products given in Table 3B, Column B.

[d] *Census of Manufactures*, 1914, pp. 32–33.

[e] Preliminary Report of Census of 1920.

[f] Computed by division.

[g] Interpolated along a smooth curve.

[h] *Abstract of U. S. Census* for 1910, p. 347.

[i] Estimates based on reports by Census of 1920 for 25 States.

Another important class of animal products consists of poultry and eggs. For these articles, relatively little information is available for the intercensal years. The Census figures themselves are to a considerable extent estimates—hence no high degree of accuracy can be expected in the final results. The interpolations recorded in Tables 3D and 3E have been based upon shipments of poultry and eggs on the railways and receipts at the leading markets combined with the average prices for chickens and eggs as reported by the United States Department of Agriculture.

TABLE 3D

AN ESTIMATE OF THE VALUE OF POULTRY CONSUMED OR SOLD BY FARM FAMILIES

A	B	C	D	E	F	G
Year	Preliminary index of quantity of poultry produced [a]	Average price paid farmers for chickens [b] (Cents per lb.)	Index of total value of poultry produced $\frac{B \times C}{10}$	Census estimate of value of products [c] (Thousands)	Ratio of E to D	Estimated total net product (Millions) D × F
1909..	3,463	10.67	3,695	$192,500	52.1 [e]	$192
1910..	3,538	11.69	4,136		49.8 *f*	206
1911..	3,651	10.72	3,914		48.0 *f*	188
1912..	3,812	10.89	4,151		46.0 *f*	191
1913..	3,923	11.77	4,618		44.2 *f*	204
1914..	3,992	12.21	4,874		42.5 *f*	207
1915..	4,046	11.88	4,807		40.8 *f*	196
1916..	4,268	13.27	5,664		39.4 *f*	223
1917..	4,030	16.67	6,718		38.1 *f*	256
1918..	4,141	20.85	8,633		36.7 *f*	317
1919..	4,200 [d]	23.84	10,012	$356,200	35.6 [e]	356
1920..	4,000 [d]	26.12	10,448		34.5 *f*	360

[a] Sum of thousands of tons of poultry, game and fish originating on railways as freight; one-tenth of cars of live poultry reaching New York City; packages of dressed poultry reaching New York City, divided by 2,000; and 0.3 of number of farms in United States. The last item is added to account for home consumption.

[b] Average of prices for 12 months—see *Monthly Crop Reporter* for December of each year.

[c] 95 per cent of value of poultry raised, the other 5 per cent being allowed for losses. See *Abstract of Census of 1910*, p. 353, and preliminary reports of 1920 Census for 25 States.

[d] Preliminary estimate.

[e] Computed by division.

f Interpolated along a smooth curve.

TABLE 3E

AN ESTIMATE OF THE VALUE OF POULTRY AND EGGS CONSUMED OR SOLD BY FARM FAMILIES

A	B	C	D	E	F
Year	Millions of dozens of eggs not used for hatching	Average price to farmers per dozen eggs	Total value of eggs to farmers (Millions) B × C	Total value of poultry to farmers [g] (Millions)	Total value to farmers of poultry and eggs consumed or sold (Millions) D + E
1909...	1,516 [ab]	$0.1926 [b]	$292	$192	$484
1910...	1,600 [c]	.1999 [c]	320	206	526
1911...	1,699 [c]	.1730 [f]	294	188	482
1912...	1,601 [c]	.1986 [f]	318	191	509
1913...	1,561 [c]	.1922 [f]	300	204	504
1914...	1,491 [c]	.2041 [f]	304	207	512
1915...	1,691 [c]	.2005 [f]	339	196	535
1916...	1,629 [c]	.2257 [f]	368	223	591
1917...	1,470 [c]	.3112 [f]	457	256	713
1918...	1,406 [c]	.3644 [f]	512	317	829
1919...	1,544 [ad]	.4065 [d]	628	356	984
1920...	1,481 [e]	.4460 [f]	660	360	1,020

[a] Number of eggs produced minus two for each fowl raised.
[b] *Abstract of Census* for 1910, p. 353.
[c] Interpolated upon the basis of egg receipts at 7 leading markets.
[d] Preliminary report of 1920, Census.
[e] Rough estimate.
[f] Interpolated upon basis of average monthly prices as reported by the Department of Agriculture.
[g] See Table 3D, Column G.

The fact is worthy of note that though the value has greatly increased, the quantity of eggs produced has actually diminished during the decade, indicating that the per capita egg supply available for the people of the United States is decreasing still more rapidly.

The productions of wool and of mohair are reported for the Census years, presumably with a reasonable degree of accuracy. The interpolation for the intercensal years has been made by aid of the figures from the Department of Agriculture "Desk Sheet" furnished through the courtesy of the Bureau of Crop Estimates. There seems no reason to believe that the figures thus arrived at are seriously in error.

TABLE 3F

AN ESTIMATE OF THE VALUE OF WOOL AND MOHAIR PRODUCED IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Year	Value reported by the Census (Thousands)	Value of wool as estimated by the Department of Agriculture [c] (Thousands)	Ratio of B to C	Probable value of product (Millions) C × D
1909	$66,374 [a]	$ 65	1.021 [d]	$ 66
1910		72	.958 [e]	69
1911		52	.942 [e]	49
1912		55	.909 [e]	50
1913		51	.902 [e]	46
1914		53	.887 [e]	47
1915		65	.862 [e]	56
1916		80	.850 [e]	68
1917		133	.827 [e]	110
1918		173	.809 [e]	140
1919	129,000 [b]	162	.796 [d]	129
1920		125	.784 [e]	98

[a] *Abstract of Census* of 1910, p. 352.
[b] Estimated on basis of preliminary bulletin of Census, issued April 11, 1921; allowance made for mohair.
[c] From *Desk Sheet* of Bureau of Crop Estimates.
[d] Computed by division.
[e] Interpolated along a straight line.

The preliminary estimates of the Census indicate a clip of only 240,000,000 pounds of wool in 1919 as against 289,000,000 pounds in 1909, showing a rather sharp decrease in the physical production of this commodity.

Most business plants have bookkeeping systems and make annual inventories, the changes in which affect the accounts of profit and loss. The Department of Agriculture estimates one very large item in the agricultural inventory at the beginning of each year, namely, the value of live stock on hand. The changes in this item are so large that it seems advisable to take them into account in making up the net totals for the agricultural industry. Since many fluctuations in the total money value of live stock arise solely from changes in prices and hence represent no real variations in the numbers or weights of animals, it has been necessary to use a rather devious plan of computation in order to secure figures which show the magnitude of the changes in the physical quantity on hand, which have occurred between the respective inventory periods. This computation is recorded in Table 3G.

TABLE 3G

AN ESTIMATE OF THE VARIATIONS IN THE VALUE OF THE AGGREGATE OF LIVE STOCK ON THE FARMS OF THE UNITED STATES

A	B	C	D	E	F	G	H	I	J
Year	Census estimate of value of all live-stock on farms Jan. 1[a] (Millions)	Agricultural Department estimate of value of domestic animals[d] on farms Jan. 1 (Millions)	Ratio of B to C	Probable value of all live-stock (Millions) C × D	Index of prices of farm animals January 15[h]	Value of all live-stock at 1913 prices Jan. (Millions) $\frac{E}{F}$	Gain in inventory of animals at prices of 1913 (Millions)	Index of prices of farm animals[h] (Average for year)	Gain in inventory at current prices (Millions) H × I
1909....		$4,525	1.004	$4,543	.845	$5,375	—$587	.890	—$523
1910....	$4,925[b]	4,911	1.003[f]	4,925	1.029	4,788	+ 430	1.001	+ 430
1911....		5,276	.995[g]	5,250	1.006	5,218	+ 382	.882	+ 337
1912....		5,008	.990[g]	4,960	.886	5,600	− 188	.925	− 174
1913....		5,502	.984[g]	5,412	1.000	5,412	+ 50	1.000	+ 50
1914....		5,891	.977[g]	5,755	1.053	5,462	+ 408	1.002	+ 409
1915....		5,969	.971[g]	5,800	.988	5,870	+ 109	.938	+ 102
1916....		6,021	.965[g]	5,810	.972	5,979	− 544	1.047	− 569
1917....		6,736	.958[g]	6,454	1.187	5,435	− 525	1.412	− 742
1918....		8,284	.953[g]	7,896	1.608	4,910	+ 60	1.593	+ 96
1919....		8,828	.946[g]	8,352	1.681	4,970	+ 410	1.577	+ 646
1920....	$7,996[c]	8,507	.940[f]	7,996	1.486	5,380	− 85	1.398	− 119

[a] Census of 1910 was taken April 15.
[b] *Abstract of U. S. Census* of 1910, p. 312.
[c] Estimated from U. S. Census reports for 25 States.
[d] Includes horses, mules, cattle, sheep, and swine.
[e] *Monthly Crop Reporter* and *Yearbooks* of Dept. of Agriculture.
[f] Computed by division.
[g] Interpolated along a straight line.
[h] Average of indices for meat animals and for horses, weighting the former 2 and the latter 1. Data from *Monthly Crop Reporters*.

In Table 3H, the values of the various animal products are summarized. The figures used in the derivation of the estimates for honey and wax produced and for horses sold off farms are not shown, as these are relatively minor items and no first class data are available as a basis for interpolation.

The value of horses sold off the farms has been computed on the assumption that one-fourteenth of the city supply is replaced annually. The number of horses in cities is estimated from the Census by aid of a smooth curve. The values per head are those stated in the Census with interpolations for intercensal years based upon the Department of Agriculture reports of farm prices for horses and mules. The numbers multiplied by these average values are used as estimates of the total values of horses and mules sold to supply city needs. To these totals have been added quantities representing 90 per cent of the excess in the value of exports over

imports, it being assumed that the farmers would receive 10 per cent less than the export value.

The estimated amounts representing the production of honey and wax have been roughly interpolated between the values recorded by the Census in 1909 and 1919, the "Desk Sheet" furnished by the Bureau of Crop Estimates being used as an approximate guide. Since the value of wax produced in 1919 has not yet been reported by the Census, a slight adjustment has been made in the reported honey value in order to take both into account.

TABLE 3H

AN ESTIMATE OF THE AGGREGATE FARM VALUE OF ANIMAL PRODUCTS PRODUCED ON THE FARMS AND RANGES OF THE CONTINENTAL UNITED STATES

(Values in Millions of Dollars)

Year	All animal products	Larger animals slaughtered [a]	Dairy products [b]	Poultry and eggs [c]	Wool and mohair [d]	Honey and wax [e]	Horses sold for city use [e]	Gains in livestock inventory [f]
1909....	$2,218	$1,381	$ 771	$ 484	$ 66	$ 6	$ 31	−$523
1910....	3,277	1,382	829	526	69	6	35	+ 430
1911....	2,968	1,269	790	482	49	6	35	+ 337
1912....	2,585	1,314	845	509	50	6	35	− 174
1913....	2,989	1,501	847	504	46	6	34	+ 50
1914....	3,359	1,480	840	512	47	6	65	+ 409
1915....	3,166	1,500	861	535	56	6	105	+ 102
1916....	3,041	1,892	943	591	68	7	108	− 569
1917....	3,902	2,489	1,250	713	110	9	73	− 742
1918....	6,189	3,497	1,581	829	140	12	34	+ 96
1919....	7,228	3,618	1,813	984	129	13	25	+ 646
1920....	5,882 [g]	2,874	1,974	1,020	98	15	20	− 119

[a] See Table 3A, Column G.
[b] Sum of items in Table 3B, Column F and Table 3C, Column J.
[c] See Table 3E, Column F.
[d] See Table 3F, Column E.
[e] For description of derivation, see the text.
[f] See Table 3G, Column J.
[g] Rough preliminary figures.

The value of all animal products showed an upward trend throughout the period until 1919. In 1920, however, there was a sharp diminution in the total value, this being mainly occasioned by a fall in the value of meat animals. Because of variations in the value of money, the apparent changes in total values must, of course, not be construed to indicate corresponding changes in the physical output of livestock products.

§ 3d. The Value of Crops Not Fed to Live Stock

In addition to livestock products, farmers and their families consume large quantities of fruits and vegetables, burn fuel from the farm, and sell great amounts of grain and other vegetable products for use by other persons. To calculate the net value of crops thus consumed or sold is not a simple matter. It is first necessary to subtract the amount used for seed. This amount has been calculated by multiplying the normal seed requirements per acre of each crop by the acreage in each year and deducting the resulting amount from the crop of the year previous, since it was from this supply that the farmer reserved his seed.

Estimates of grain fed to livestock have been based upon the 1910 Census and carried forward by aid of the reports in the *Monthly Crop Reporter*[1] showing the quantities in each year not shipped outside the county where grown.

The Census enumerators failed to secure complete reports for farm gardens, hence an estimated item has been added to fill in the omission. In 1910, there were reported 707,763 gardens for which no value of products was assigned. W. C. Funk in *Farmers' Bulletin 635*, published by the Department of Agriculture, shows that the average farm garden produced for home consumption fruit and vegetables worth $52. If the non-reported gardens produced half as much, or $26 each, the total would be $18,624,000 for 1909. This amount has been varied in other years in proportion to the combined value of the reported crops of beans and white and sweet potatoes.

[1] Published by the Bureau of Crop Estimates.

TABLE 3I

AN ESTIMATE OF THE VALUE OF CROPS SOLD OFF THE FARMS OR CONSUMED DIRECTLY BY FARM FAMILIES

A	B	C	D	E	F	G	H	I	J
Year	Census estimate of value of all recorded crops (Millions)	Agricultural Department estimate of value of all recorded crops [c] (Millions)	Ratio of B to C	Probable value of all recorded crops (Millions) C × D	Value of non-recorded gardens [f] (Millions)	Total value of all crops (Millions) E + F	Value of crops fed to livestock on farms [f] (Millions)	Value of seeds cuttings and plants for next year's crop [f] (Millions)	Net value of all crops consumed on or sold off farms (Millions) G − (H+I)
1909	$ 5,487 [a]	$ 5,487	1.000 [d]	$ 5,487	$19	$ 5,506	$2,601	$143	$2,762
1910		5,486	.995 [e]	5,461	17	5,478	2,645	138	2,696
1911		5,562	.991 [e]	5,511	20	5,531	2,793	153	2,585
1912		5,842	.986 [e]	5,762	18	5,780	2,826	139	2,816
1913		6,133	.982 [e]	6,020	20	6,040	2,924	145	2,971
1914		6,112	.977 [e]	5,971	18	5,989	2,985	184	2,820
1915		6,907	.972 [e]	6,717	20	6,737	3,182	207	3,347
1916		9,054	.968 [e]	8,763	35	8,798	3,926	331	4,541
1917		13,479	.963 [e]	12,983	50	13,033	6,209	395	6,429
1918		14,094	.959 [e]	13,511	47	13,558	5,989	450	7,119
1919	$15,295 [b]	16,035	.954 [d]	15,295	52	15,347	6,550	434	8,362
1920		10,465	.949 [e]	9,935	45	9,980	4,604	282 [g]	5,094

[a] *Statistical Abstract* for 1916, pp. 155–156.
[b] Calculated from data in Press Summary of April 11, 1921, furnished by the Census.
[c] *Monthly Crop Reporter* for December and *Yearbooks* of the Department of Agriculture.
[d] Computed by division.
[e] Interpolated along a straight line.
[f] For mode of estimation, see text.
[g] Rough preliminary estimate.

Table 3I indicates that between 1914 and 1919 there was an enormous increase in the book income of agriculturalists from the sale or consumption of crops and that this book income diminished very sharply from 1919 to 1920. These fluctuations were doubtless due far more to price changes than to variations in physical output.

§ 3e. Payments by Agriculture for the Products of Other Industries

In computing the net value product of agriculture, it is, as before explained, necessary to deduct from the gross output amounts paid to other recorded industries for their services. The chief deductions made are those

for the cost of agricultural implements, fertilizers, automobiles used in farm business, harness and saddles, fire insurance, and interest paid to banks. The estimates of these quantities have been recorded in Table 3J.

The value of agricultural implements purchased by farmers has been estimated for the Census years by subtracting from the values of those reported as manufactured the excess values of exports over imports, and multiplying the remainder by 1.20[1] in order to allow for the profits made by retailers. The interpolation for the intercensal years has been based upon an index representing the product of the tons of agricultural implements shipped on the railways (as reported by the Interstate Commerce Commission), and the prices of agricultural implements (as compiled from the records of the United States Department of Agriculture and the International Harvester Company).

That not all of the implements purchased are used up in the year when bought is evidenced by the Census report indicating an increase in the physical supply between 1910 and 1920 amounting to about 41 per cent of all purchases during the decade. The remaining 59 per cent has therefore been assumed to represent the current cost to the industry.

The Census records the amount paid by farmers for fertilizer in the Census years. For the intervening years, the amounts have been estimated on the basis of the figures in the American Fertilizer Handbook, a publication which reports for each year the approximate number of tons of fertilizer used in the United States and also the prices of leading varieties. The average price per ton has been estimated therefrom and multiplied by the tons used in order to obtain an estimate of the total value. This estimate has been corrected by comparing with the amount reported in the Census years and the interpolation has been carried out according to the usual ratio method, using a smooth curve for estimating the ratios in the intercensal years.

It is, of course, impossible to say just what share of the expense of automobiles used on farms should be allowed as a business cost and how much should be charged against pleasure; nevertheless, some rough apportionment must be made. According to the National Automobile Chamber of Commerce,[2] farmers in 1919 operated 32.6 per cent of all cars. These cars are perhaps somewhat smaller than city cars on the average but probably make up at least one-fourth of the automobile value of the country. By combining this figure with others arrived at in the study of the industry of repairing automobiles, one is led to the conclusion that if 40 per cent of total costs be charged to business uses, the figures presented

[1] Ratio based upon a study of the Federal Trade Commission report on the Agricultural Implement Industry.

[2] *Facts and Figures of the Automobile Industry*, 1920, p. 13.

in Table 3J, may represent a rough approximation to the business expense to farmers of the automobiles which they operate.

The amount expended for harness and saddles has been estimated by a rather complex process which presumably gives results not very far from the truth. The gist of the plan is as follows: For the Census years 1909, 1914, and 1919, the quantity of harness and saddlery manufactured is recorded. From this amount in each case the value of exports has been subtracted, there being no imports recorded. It has been assumed that, of the remainder, farmers use the same proportion as *farm* horses and mules constitute of *all* horses and mules. The interpolations for the intercensal years have been made on the basis of an index representing the product of the number of horses and mules on farms and the price of harness to farmers, both figures being taken from the *Monthly Crop Reporter* published by the Agricultural Department. The customary ratio method has been used, the ratio for the intercensal years being interpolated along a smooth curve.

Farmers pay a considerable amount annually for fire insurance and for interest on loans from banks, but there is no information available throwing any definite light on the size of either of these quantities. The assumption has been made that the excess of interest paid to banks over interest received therefrom amounts to 1 per cent of the total crops and animal products sold or consumed. A study of the reports of the Comptroller of the Currency for the smaller banks indicates that it is improbable that the amount is much larger than this, but it may be somewhat smaller.

The cost of fire and tornado insurance has been assumed to be one-tenth of one per cent of the value of all farm buildings. The value of the buildings is given by the Census of 1910 and has been estimated for 1920 on the basis of the preliminary States reports already published. The interpolation has been made along a smooth curve.

An important deduction which is omitted from the list here given is the amount of taxes paid by farmers for services rendered by the various branches of government to their business. This item has been left out because of the impracticability of estimating what part of the service of government benefits the farmer as an entrepreneur and what part contributes to his needs as a consumer. The failure to allow for this expense makes the net value product of agriculture as here stated somewhat larger than the correct figure and also makes the percentage of the value product recorded as being paid to employees slightly smaller than it really is. The error is, however, presumably not large enough to be of very serious moment.

TABLE 3J

DEDUCTIONS FROM THE GROSS VALUE PRODUCT OF AGRICULTURE ON ACCOUNT OF BUSINESS PAYMENTS MADE TO OTHER INDUSTRIES

(Millions of dollars)

Calendar year	Total deductions	Value of implements purchased [a]	Value of fertilizers purchased [a]	Expense for business use of automobiles [a]	Value of harness and saddles purchased [a]	Expense of insurance against fire and wind [a]	Interest paid to banks for loans [a]
1909.....	$ 319	$ 85	$115 [b]	$ 6	$ 57 [b]	$ 6	$ 50
1910.....	384	116	135	9	57	6	60
1911.....	404	103	160	20	59	7	56
1912.....	405	107	147	32	58	7	54
1913.....	449	122	161	42	58	7	60
1914.....	467	93	188 [b]	58	57 [b]	7	62
1915.....	446	90	160	83	64	7	65
1916.....	551	111	162	116	77	8	76
1917.....	785	149	222	186	116	8	103
1918.....	1,031	183	294	274	139	8	133
1919.....	1,276	187	329 [b]	417	177 [b]	9	156
1920.....	1,300	239	360 [c]	400 [c]	177	11	110

[a] For mode of estimating these items, see the text.
[b] Derived from the Census.
[c] A guess.

The indications from Table 3J are that the combined deductions form a sum which is relatively small as compared to the net value product of this industry.

§ 3f. The Net Value Product of Agriculture

We are now in a position to estimate the total net value product of the industry. In making up this aggregate, it seems necessary to add to the combined value of crops and animal products a small allowance for the improvement in farm lands brought about by the labor of the farmer. This item should be clearly distinguished from the increase in farm values caused by currency inflation or relative increase in urban population. The mode of estimating the additional land value created by the efforts of farmers has been to subtract the farm acreage in 1910 from that in 1920, distribute this amount among the various intervening years, and multiply the estimated acreage increase in each year by the current value of land per acre. This average land value has been calculated from the Census reports and the index of land values found in the Department of Agriculture's *Monthly Crop Reporter*.

Another source of income to farmers which is of considerable importance

is the rental value of farm homes. Some time was devoted to estimating this amount but the ultimate conclusions reached were that the net rent was just about equalled by the expense for materials needed for the construction of all farm buildings and fences. Under these circumstances, it was decided to omit both items from the computation.

Table 3K summarizes the chief factors entering into the net value product of agriculture.

TABLE 3K

AN ESTIMATE OF THE TOTAL NET VALUE PRODUCT OF AGRICULTURE IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F
Calendar year	Value of animal products [a] (Millions)	Net value of crops consumed or sold off farm [c] (Millions)	Increase in land value due to improvements by farmers [d] (Millions)	Business expenditure for products of other industries [e] (Millions)	Net value product of agriculture (Millions) B+C+D−E
1909.....	$2,218	$2,762	$ 25	$ 319	$ 4,686
1910.....	3,277	2,696	139	384	5,728
1911.....	2,968	2,585	219	404	5,368
1912.....	2,585	2,816	290	405	5,286
1913.....	2,989	2,971	376	449	5,887
1914.....	3,359	2,820	328	467	6,040
1915.....	3,166	3,347	310	446	6,376
1916.....	3,041	4,541	218	551	7,249
1917.....	3,902	6,429	174	785	9,720
1918.....	6,189	7,119	405	1,031	12,682
1919.....	7,228	8,362	520	1,276	14,835
1920.....	5,882 [b]	5,094	177	1,300 [b]	9,853 [b]

[a] See Table 3H.
[b] Rough preliminary figures only.
[c] See Table 3I, Column J.
[d] For mode of derivation, see text.
[e] See Table 3J.

The net value product of agriculture evidently increased very rapidly between 1915 and 1919, but suffered a sharp decline in 1920.

§ 3g. The Share of the Employees

It is desirable next to learn what share of this net value product is paid out in the form of wages or salaries (including under these heads, board and lodging furnished to employees), and also the average wage paid per employee. The mode of estimation used is shown in Tables 3L, 3M, and 3 N.

TABLE 3L

AN ESTIMATE OF THE AGGREGATE OF WAGES AND SALARIES PAID BY FARMERS TO EMPLOYEES

A	B	C	D	E	F
Calendar year	Wages of farm hands (Census years) (Thousands)	Index of total payments to farm labor[c] (Thousands)	Ratio of B to C	Estimated total wage of farm hands (Millions) C × D	Estimated total wages paid to employees on farms[f] (Millions) $\frac{11}{10}$ E
1909.....	$651,611[a]	7,918	82.29[d]	$ 652	$ 717
1910.....		8,000	81.37[e]	651	716
1911.....		8,546	80.42[e]	687	756
1912.....		8,710	79.47[e]	692	761
1913.....		9,100	78.52[e]	715	786
1914.....		8,980	77.67[e]	697	767
1915.....		9,330	76.62[e]	715	786
1916.....		10,170	75.77[e]	771	848
1917.....		12,890	74.72[e]	963	1,059
1918.....		15,390	73.87[e]	1,137	1,251
1919.....	$1,363,454[b]	18,720	72.83[d]	1,363	1,500
1920.....		22,000	71.97[e]	1,583	1,742

[a] Census of Agriculture, 1910, Vol. V., p. 563. Includes board and lodging.

[b] Preliminary bulletin of the Census, June 29, 1921.

[c] The product of the acreage of leading crops, and the average monthly wage of farm hands without board, as reported by the Bureau of Crop Estimates of the Department of Agriculture.

[d] Computed by division.

[e] Interpolated along a straight line.

[f] Assumed that domestics receive one-tenth the total wages paid farm hands. The allowance here is for only that share of domestic labor required to facilitate the productive work of the farm.

TABLE 3M

AN ESTIMATE OF THE NUMBER OF EMPLOYEES ON THE FARMS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G
Year	Total wages paid to farm hands [a] (Millions)	Estimated average full-time wage for farm hands [d]	Estimated number of full-time hands required (Thousands) $\frac{B}{C}$	Estimated fraction of workers actually employed [c]	Number of farm hands attached to the industry (Thousands) $\frac{D}{E}$	Number of employees attached to the industry [e] (Thousands)
1909....	$ 652	$363	1,794	.881	2,037	2,376
1910....	651	352	1,849	.907	2,039	2,379
1911....	687	367	1,873	.915	2,047	2,388
1912....	692	378	1,831	.894	2,048	2,390
1913....	715	389	1,837	.895	2,052	2,394
1914....	697	386	1,809	.882	2,051	2,393
1915....	715	389	1,838	.900	2,042	2,382
1916....	771	422	1,825	.897	2,034	2,373
1917....	963	526 [b]	1,832	.934	1,961	2,288
1918....	1,137	652	1,744	.959	1,818	2,121
1919....	1,363	767	1,778	.934	1,903	2,220
1920....	1,583	846	1,872	.923	2,028	2,366

[a] See Table 3L, Column E.

[b] A weighted average of summer and winter wages and of wages of different classes of laborers. Data from the 1918 *Annual Report* of the Iowa Bureau of Labor, p. 139, and from the Agricultural Department *Crop Report*, March, 1918, p. 24.

[c] A rough estimate.

[d] Includes value of any food and lodging furnished.

[e] Includes the estimated number of domestic servants required to facilitate the productive work of the farm.

TABLE 3N

AN ESTIMATE OF THE AVERAGE ANNUAL EARNINGS OF FARM EMPLOYEES[a] IN THE CONTINENTAL UNITED STATES AND THEIR SHARE IN THE NET VALUE PRODUCT OF AGRICULTURE

A	B	C	D	E	F	G	H
Year	Total money wages[b] (Millions)	Number of employees attached to the industry[c] (Thousands)	Average annual earnings per employee $\frac{B}{C}$	Index of prices of goods consumed by manual and clerical workers[d]	Purchasing power of average annual earnings at prices of 1913 $\frac{D}{E}$	Net value product of agriculture[e] (Millions)	Per cent of value product paid out in wages and salaries $\frac{B}{G}$
1909....	$ 717	2,376	$302	.955	$316	$ 4,686	15.3
1910....	716	2,379	301	.978	308	5,728	12.5
1911....	756	2,388	317	.984	322	5,368	14.1
1912....	761	2,390	319	.994	321	5,286	14.4
1913....	786	2,394	328	1.000	328	5,887	13.4
1914....	767	2,393	321	1.01	317	6,040	12.7
1915....	786	2,382	330	1.03	320	6,376	12.3
1916....	848	2,373	357	1.10	325	7,249	11.7
1917....	1,059	2,288	463	1.29	359	9,720	10.9
1918....	1,251	2,121	590	1.58	373	12,682	9.9
1919....	1,500	2,220	675	1.773	381	14,835	10.1
1920....	1,742	2,366	736	2.165	340	9,853	17.7

[a] Includes both farm hands and domestic servants.
[b] See Table 3L, Column F.
[c] See Table 3M, Column G.
[d] Bureau of Labor index carried back by means of a special study.
[e] See Table 3K, Column F.

The preceding tables indicate that the number of employees attached to the industry has increased but slightly during the decade, a conclusion which accords with the almost stationary number of farms shown by the Census. Average wages, when measured in terms of purchasing power, were just a little higher in 1920 than in 1909, though the years 1917 to 1919 were marked by a noticeable increase in the prosperity of the farm laborer. In all years, the wages of farm laborers are much lower than are those of employees in most other lines even when an allowance is made for board and lodging at farm prices, but this differential is doubtless accounted for to some extent by the fact that food and lodging are valued on the farm at rates much cheaper than those which must be paid by city workers for goods or services of equal quality. The fraction of the total net value product paid out in salaries and wages is evidently far lower than in most other industries, due doubtless to the large number of farm operators who

have practically no hired employees. The percentage rose sharply in 1920, the laborers not suffering from the price decline as severely as did the entrepreneurs.

§ 3h. The Share of the Entrepreneurs and Other Property Owners

Table 30 shows that the entrepreneurs and other property owners attained unusual prosperity in the years 1917 to 1919 inclusive, but that 1920 was for them materially the worst year in the decade, their income being less than half what it was in the year previous.

TABLE 30

AN ESTIMATE OF THE SHARE OF THE ENTREPRENEURS AND OTHER PROPERTY OWNERS[a] IN THE NET VALUE PRODUCT OF AGRICULTURE

A	B	C	D	E	F
Year	Total net value product[b] (Millions)	Share of employees[c] (Millions)	Share of entrepreneurs and other property owners (Millions) B — C	Index of prices of goods consumed by workers and well-to-do families[d]	Purchasing power of share of entrepreneurs and other property owners at price of 1913 (Millions) D/E
1909.....	$ 4,686	$ 717	$ 3,969	.955	$4,156
1910.....	5,728	716	5,012	.978	5,124
1911.....	5,368	756	4,612	.984	4,687
1912.....	5,286	761	4,525	.995	4,547
1913.....	5,887	786	5,101	1.000	5,101
1914.....	6,040	767	5,273	1.011	5,215
1915.....	6,376	786	5,590	1.023	5,464
1916.....	7,249	848	6,401	1.097	5,835
1917.....	9,720	1,059	8,661	1.280	6,766
1918.....	12,682	1,251	11,432	1.547	7,390
1919.....	14,835	1,500	13,335	1.747	7,634
1920.....	9,853	1,742	8,111	2.124[e]	3,819[e]

[a] Includes owners of rented farms and owners of farm mortgages.
[b] See Table 3K, Column F.
[c] See Table 3L, Column F.
[d] An average of the indices for the working classes and for families spending $5,000 on consumption goods, the weights used being 3 and 1 respectively.
[e] Rough preliminary estimate.

§ 3i. The Physical Output of Agricultural Produce

It is also of interest to see whether the output of the industry is increasing or diminishing. This point is covered by the figures in Table 3P.

TABLE 3P

AN ESTIMATE OF THE VALUE AT PRICES OF 1913 OF ALL PRODUCTS CONSUMED BY FARMERS OR SOLD OFF THE FARMS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H
	Crops			Animals and animal products			All products
Year	Value at prices of December 1st [a] (Millions)	Index of prices at December 1st	Value at prices of December 1st, 1913 (Millions) B/C	Value at average prices of year [b] (Millions)	Index of average prices of year [c]	Value at average prices of 1913 (Millions) E/F	Value at 1913 prices (Millions) D + G
1909..	$2,762	.957 [d]	$2,886	$2,218	.891	$2,489	$5,375
1910..	2,696	.887 [d]	3,039	3,277	.987	3,320	6,359
1911..	2,585	.997 [c]	2,593	2,968	.850	3,492	6,085
1912..	2,816	.879 [c]	3,204	2,585	.925	2,795	5,999
1913..	2,971	1.000 [c]	2,971	2,989	1.000	2,389	5,960
1914..	2,820	.883 [c]	3,194	3,359	1.022	3,287	6,481
1915..	3,347	.969 [c]	3,454	3,166	.963	3,287	6,741
1916..	4,541	1.610 [c]	2,821	3,041	1.098	2,769	5,590
1917..	6,429	2.050 [c]	3,136	3,902	1.557	2,506	5,642
1918..	7,119	2.101 [c]	3,389	6,189	1.851	3,344	6,733
1919..	8,362	2.436 [c]	3,433	7,228	1.962	3,684	7,117
1920..	5,094	1.401 [c]	3,636	5,882 [f]	1.833	3,209	6,845

[a] See Table 3I.
[b] See Table 3H.
[c] Computed from table in *Monthly Crop Reporter*, Dec. 1920, p. 150, weighting crops in proportion to importance of sales or home consumption.
[d] Estimated on basis of index of all crops. See *Yearbook* of Department of Agriculture, 1918, p. 701.
[e] Average of prices of meat animals, poultry, eggs, and dairy products weighted in proportion to the sales of each in 1919. Data from *Monthly Crop Reporter*.
[f] Rough estimate only.

Table 3P makes it clear that the physical volume of agricultural products has tended to increase slowly during the decade, 1919 being the banner year.

It is however, of greater interest to learn whether the output per person engaged in agriculture is increasing or diminishing and also whether the output is or is not keeping pace with the growth of population in the United States. The facts in this connection are shown in Table 3Q.

TABLE 3Q

AN ESTIMATE FOR THE CONTINENTAL UNITED STATES OF THE OUTPUT OF AGRICULTURAL PRODUCTS PER INHABITANT AND PER PERSON ENGAGED IN AGRICULTURE

A	B	C	D	E	F	G	H
Year	Thousands of Persons Engaged in Agriculture			Estimated Population of United States,[e] June 30 (Millions)	Value of Output at Prices of 1913		
	Farmers	Employees[d]	Total		Total[f] (Millions)	Per person engaged in agriculture F ÷ D	Per inhabitant of the United States F ÷ E
1909...	6,330[c]	2,376	8,706	90.4	$5,375	$617	$59
1910...	6,362[a]	2,379	8,741	92.2	6,359	727	69
1911...	6,376[c]	2,388	8,764	93.8	6,084	694	65
1912...	6,388[c]	2,390	8,778	95.3	5,999	683	63
1913...	6,400[c]	2,394	8,794	97.3	5,960	678	61
1914...	6,410[c]	2,393	8,803	99.2	6,481	736	65
1915...	6,418[c]	2,382	8,800	100.4	6,741	766	67
1916...	6,425[c]	2,373	8,798	101.7	5,590	635	55
1917...	6,432[c]	2,288	8,720	103.1	5,642	647	55
1918...	6,438[c]	2,121	8,559	104.2	6,733	786	65
1919...	6,443[c]	2,220	8,663	104.8	7,117	821	68
1920...	6,448[b]	2,366	8,814	106.6	6,845[g]	777	64

[a] *Abstract of Census* of U. S. 1910, p. 265. Number of farms is identical with number of farmers.
[b] Press bulletin of Bureau of Census, June 22, 1921.
[c] Interpolated along a smooth curve.
[d] See Table 3M, Column G.
[e] Interpolated between Census estimates by means of a special study elsewhere recorded.
[f] See Table 3P, Column H.
[g] Rough estimate only.

The figures in Column G show that the gross value of the output per person engaged in agriculture is about the same as the average annual earnings of factory or railway employees. From this gross output, however, the agriculturalist must subtract payments for interest, insurance, fertilizers, machinery, etc., before arriving at his net income and this net income includes not only payment for his services but also for the use of any property which he may possess and for any farm work performed by his wife or children. It seems clear then that when farm laborers and farmers are considered as a joint group, their economic condition, if measured in monetary terms, compares unfavorably with that of the employees of railways or of manufacturing concerns.

The last column of the table shows that gross agricultural output is just

about keeping pace with the population of the nation, no marked trend being discernible.

§ 3j. The Relative Position of Agriculture Among the Industries

The final question to be considered is: "Is agriculture playing an increasing or diminishing rôle in the industry of the country?" This query is answered by Table 3R which shows that the proportion of the total value product of all industries produced by agriculture remained nearly constant until 1917 and then rose very sharply. The probabilities are, however, that the percentage will fall very materially in 1920.

TABLE 3R

THE PER CENT OF THE NET VALUE PRODUCT OF ALL INDUSTRIES IN THE CONTINENTAL UNITED STATES PRODUCED BY AGRICULTURE

Year	Total net value product of all industries [c] (Millions)	Net value product of agriculture [b] (Millions)	Per cent of the net value product originating in agriculture
1909	$28,775	$ 4,686	16.3
1910	31,766	5,728	18.0
1911	31,188	5,368	17.2
1912	33,554	5,286	15.8
1913	35,580	5,887	16.5
1914	33,936	6,040	17.8
1915	36,109	6,376	17.7
1916	45,418	7,249	16.0
1917	53,860	9,720	18.0
1918	60,366	12,682	21.0
1919	65,000 [a]	14,835	22.8 [a]
1920		9,853 [a]	

[a] Rough preliminary estimate only.
[b] See Table 3K, Column F.
[c] Summary compiled from the reports of the separate industries.

§ 3k. Returns for the Efforts of Farm Operators

It is a fact worthy of comment that while about thirty per cent of the gainfully employed persons in the United States are engaged in agriculture, the industry normally receives only about seventeen per cent of the national income. In a preceding paragraph, attention has been called to the relatively small average income received by farmers and agricultural laborers when considered as a single class. Column D of Table 3N makes it clear, however, that agricultural laborers receive low wages. Do farm operators secure high returns for their physical and mental effort and managerial skill? Table 3S has been constructed with a view to answering that query.

TABLE 3S

AN ESTIMATE OF THE REWARDS FOR MANAGEMENT AND LABOR RECEIVED BY THE FARMERS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I	J
Year	Total value of farm property including cash used as working capital [g] (Millions)	Assumed interest rate on investment	Rewards ascribable to property (Millions) B × C	Total returns to entrepreneurs and other property owners [d] (Millions)	Reward for farmer's management and labor (Millions) E — D	Number of farmers [e] (Thousands)	Average reward per farmer F/G	Index of prices of goods consumed by farmers [f]	Average reward per farmer at prices of 1913 H/I
1909	$40,059 [c]	.05	$2,003	$3,969	$1,966	6,330	$ 311	.955	$326
1910	41,400 [a]	.05	2,070	5,012	2,942	6,362	462	.978	472
1911	42,225 [c]	.05	2,111	4,612	2,501	6,376	392	.984	398
1912	42,917 [c]	.05	2,146	4,525	2,379	6,388	372	.995	374
1913	45,227 [c]	.05	2,261	5,101	2,840	6,400	444	1.000	444
1914	46,619 [c]	.05	2,331	5,273	2,942	6,410	459	1.011	454
1915	48,199 [c]	.05	2,410	5,590	3,180	6,418	495	1.023	484
1916	52,687 [c]	.05	2,634	6,401	3,767	6,425	586	1.097	534
1917	57,110 [c]	.05	2,855	8,660	5,805	6,432	903	1.280	705
1918	64,122 [c]	.05	3,206	11,432	8,226	6,438	1,278	1.547	826
1919	71,848 [c]	.055	3,951	13,335	9,384	6,443	1,456	1.747	833
1920	78,707 [b]	.065	5,116	8,111	2,995	6,448	465	2.124	219

[a] *Abstract of the Census* of 1910, p. 265.
[b] Preliminary Census bulletins for 1920.
[c] Interpolated
[d] See Table 3O, Column D.
[e] See Table 3Q, Column B.
[f] See Table 3O, Column E.
[g] 1.01 times the value of farm property as shown by the Census—the one per cent allowance being an estimate for the cash and bank deposits held by farmers as working capital.

Since we do not know what percentage [1] of all farms are owned by active farmers, it is impossible to ascertain either the total or average income of this class. It is, however, feasible by aid of the material at hand, to make a crude estimate of the amount received by the farmers of the country, as a reward for their physical and managerial labor. Such an estimate involves the assumption that a percentage return should be allowed on the investment before calculating the payment for the services of the farmer. This assumption is open to some criticism, but, since it is often entirely practicable for the farmer to sell all of his property and invest it in securities, there seems to be nothing unreasonable in using it as a hypothesis. It should, however, be kept firmly in mind that the amounts entered in

[1] The fact that many rented farms are owned by men who operate other farms, prevents the computation of this percentage.

Column J are not the average incomes of the farmers but only the amounts which they could count as pay for their physical and managerial services. Individual farmers who were property owners, may well have made or lost several times the recorded sum because of a rise or fall in land values during the year and that part of their income assigned to the interest allowance on the current value of their property may have been far larger than the remainder ascribed to managerial or physical effort or to other profits. Column B shows a gain of 15 billions in the value of farm property from 1919 to 1920, and, while most of this nominal gain was doubtless merely a reflection of the rise in the general price level, yet, in some sections, farm lands probably rose in value even faster than commodities in general. Were the speculative gains in such instances added to the $219 recorded in Column J, the average gain for farm owners in 1920 would doubtless compare much more favorably with other years in the decade. In connection with the latter point it should also be noted that the extremely low calculated reward for the farmer's labor and management in 1920 was occasioned to a considerable extent by the heavy property charge resulting from the unusually high land values and high interest rates current at that time.

The indications from Table 38 are then that farmers, even though they are entrepreneurs, and belong to the class usually considered to consist of men of higher talents than mere employees, nevertheless obtain on the average less money value in return for their efforts than do the average employees in most lines of industry. Only in the years 1918 and 1919 did they receive more than the average earnings for all employees in the United States, while in 1920 their rewards fell to a mere fraction of the average wage in other lines. Even though the same money will buy considerably more of certain commodities in the country than in the city, it nevertheless appears that the average farmer can scarcely with justice be considered a pampered child of fortune.

CHAPTER 4

MINES, QUARRIES, AND OIL WELLS

§ 4a. Sources of Information

The four chief sources of information concerning this field are the Census, the reports of the United States Geological Survey, the United States Income Tax data, and the reports of various State Bureaus devoted to the study of mining or labor conditions. Unfortunately, the State reports, in most instances, are either issued irregularly or fail to furnish information comparable for the various years under consideration. This necessarily results in a distinct loss of accuracy in the estimates based thereupon.

§ 4b. The Share of the Entrepreneurs and Other Property Owners

The share of the entrepreneurs and other property owners in the net value product consists of the rents, royalties, and interest received by private parties from their investments in this field plus the profits derived from the mining industry by the private or corporate entrepreneurs operating therein. In estimating the aggregate of rents and royalties, it has been assumed that these payments vary in proportion to the gross value of mineral products in the United States as reported by the United States Geological Survey. The Census of 1909 is used as a base. Royalties at a fixed rate per ton would not increase with the price level and hence contracts of this type would tend to make the estimates for the later years too high. On the other hand, many royalties become proportionally greater as mineral output increases in value. Contracts of this variety would tend to offset the effects of those of the type first mentioned. Since the relative weights of these factors are unknown, the assumption that they cancel each other is the best that can be made. The resulting estimates appear in Table 4A.

The basic estimates of profits and interest payments utilized in this study are those shown in the 1918 report of the United States Commissioner of Internal Revenue on *Statistics of Income*. It shows on page 15 that interest payments by mining corporations were $67,010,715. A study of the reports of mining corporations as given in Moody's *Manual of Corporations Statistics* indicates that about 97 per cent of the net amount of interest paid by mining corporations goes to the bondholders. The

TABLE 4A

THE ESTIMATED AGGREGATE OF RENTS AND ROYALTIES DERIVED FROM THE LEASE OF MINERAL RIGHTS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Rents plus royalties; Census years (Thousands)	Gross value of mineral output according to Geological Survey (Thousands)	Ratio of B to C in 1909	Estimated total of rents and royalties (Millions) C × D
1909	$72,945[a]	$1,887,582[b]	.03865	$ 73[a]
1910		1,992,406[b]		77
1911		1,927,532[b]		74
1912		2,243,630[b]		87
1913		2,439,160[c]		94
1914		2,118,306[c]		82
1915		2,397,745[c]		93
1916		3,514,600[c]		136
1917		4,992,128[c]		193
1918		5,543,456[c]		214

[a] Includes the $64,155,000 reported as royalties and rent of mines and $8,790,000 representing an estimated rent for offices, the amount being one-fifth of the item entered as "Rent of offices and other sundry expenses." See the *Abstract of the United States Census* for 1910, p. 541.

[b] *Statistical Abstract of the U. S.*, 1913, p. 217.

[c] *Statistical Abstract of the U. S.*, 1919, p. 243.

total bond interest paid by corporations therefore apparently amounts to about $65,000,000.

On a previous page, the fact has been noted that corporate enterprises produce about 95 per cent of the entire output of the mining industry. If their funded debt represents the same percentage of the total, it appears that in 1918 the interest thereon for the entire mining industry must have been approximately $65,000,000, divided by 0.95 or $68,400,000.

The assumption has been made that the interest payments in the earlier years varied in the same ratio as did the similar payments made by 25 typical mining corporations, the records of which appear in Moody's *Manual of Corporation Securities*. Since the amount is relatively very small, its accuracy is a matter of but minor importance.

In 1918, the reported net income after the deduction of interest and taxes, was $304,939,703.[1] The percentage of the entire gross output of minerals produced by enterprises in the corporate form increased from 86.3[2] in 1902 to 91.4[3] in 1909. It seems probable, therefore, that, by

[1] *Statistics of Income*, 1918, p. 16.

[2] *U. S. Census of Mines and Quarries*, 1902, p. 67.

[3] *U. S. Census of Mines and Quarries*, 1909, p. 32.

TABLE 4B

AN ESTIMATE OF THE TOTAL INTEREST RECEIVED ON INVESTMENTS IN MINES, QUARRIES, AND OIL WELLS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Estimated interest total for 1918 (Thousands)	Interest on funded debt paid by 25 typical mining corporations [b] (Thousands)	Ratio of B to C in 1918	Estimated total interest on investments (Millions) C × D
1909		$5,496		$45
1910		5,974		49
1911		6,753		56
1912		6,876		57
1913		6,689		55
1914		7,392		61
1915		8,051		66
1916		7,809		64
1917		7,566		62
1918	$68,400 [a]	8,306	8.234	68

[a] For derivation, see the text.
[b] From Poor's and Moody's *Manuals of Corporation Securities.*

1918, corporations had come to control 95 per cent of the value of mineral products. If so, the total net income of the mining industry may be estimated as about $321,000,000, in 1918.

The reports of 110 mining and oil producing corporations cited in Moody's *Analyses of Industrial Investments* show that 71.72 per cent of net earnings after the deduction of interest charges were paid out as dividends. If this percentage is assumed to hold for all enterprises, the conclusion is that the total disbursed profits in 1918 amounted to 0.7172 × $321,000,000, or about $230,100,000. In earlier years, these disbursed profits have been estimated upon the basis of the aggregate reported dividends of the metal mining companies reported in the *Engineering and Mining Journal* and of a few coal and iron corporations for which continuous reports are given in Poor's or Moody's *Manuals.* These dividends, as reported, contain many duplications due to the existence of holding and interlocking companies and they also include payments made by some concerns engaged largely in manufacturing. The result is that their sum is decidedly larger than the net amount indicated by the reports of the Commissioner of Internal Revenue. The mode of reduction is indicated in Table 4C.

Not all of the profits of mining concerns are withdrawn from the business by the owners, a very considerable fraction being saved. In the case

of the 25 corporations studied, the records show the fraction of the total profits carried to surplus. The assumption is made that this fraction applies to all mineral producing enterprises. The estimates based upon this premise also appear in Table 4C. The reduction of these sums to a basis of purchasing power at the price level of 1913 is shown in Table 4D.

TABLE 4C

AN ESTIMATE OF THE DISTRIBUTED PROFITS AND BUSINESS SAVINGS OF ALL MINING CONCERNS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H
Calendar year	Distributed profits as indicated by reports of income tax[a] (Thousands)	Gross dividends of selected mining and oil producing corporations[b] (Millions)	Ratio of B to C in 1918	Estimated distributed profits of all concerns (Millions) C × D	Ratio of annual surplus to dividends in selected corporations	Estimated business savings of all concerns (Millions) E × F	Estimated total profits including savings[e] (Millions) E + G
1909..		$141		$ 88	.6236[c]	$ 55	$144
1910..		147		92	.3747[c]	35	127
1911..		151		95	.3646[c]	35	130
1912..		172		108	.5954[c]	64	173
1913..		200		125	.3364[c]	42	168
1914..		170		107	.3200[c]	34	141
1915..		187		117	.7996[c]	94	211
1916..		306		192	1.0878[c]	209	402
1917..		449		282	.5229[c]	147	429
1918..	$230,100	366	.6280	230	.3436[d]	79	309

[a] For derivation, see text.

[b] These items are the respective sums of the total dividends reported in the January numbers of *The Engineering and Mining Journal* for mines of metals other than iron and of the dividends of eight important coal and iron producing corporations as reported in Moody's *Manual of Corporation Securities*.

[c] Calculated from the records of 25 typical mining corporations as reported in Moody's *Manual of Corporation Securities*.

[d] Calculated from the records of 110 selected mining and oil corporations reported in Moody's *Analyses of Industrial Investments*, 1920. This ratio corresponds quite closely to one calculated from the reports of the 25 typical corporations for the same year.

[e] Mr. W. R. Ingalls, one of our Directors, in an unpublished study on *The Value of the Mines of the United States*, estimates the average annual net earnings of the mines in the years 1911 to 1913 at $330,000,000, and is therefore inclined to think that the figures in Column H are somewhat too low for the years mentioned. He reaches his result by using as a basis the reports of the U. S. Bureau of Internal Revenue on the total income, before deducting Federal taxes, of all mining corporations in 1916. Under the law at that time, each corporation had to report its income separately; hence if one corporation paid dividends to another corporation, this income was duplicated in the totals, making them too large. As Mr. Ingalls states, the $330,000,000 is the amount before any allowance is made for depletion. It also takes in the earnings of metallurgical works which we have attempted to exclude. For our purposes, taxes must be deducted; while Mr. Ingalls has used the income figures as they stand before taking out the tax payments. In view of the facts just cited, it is evident that there may be no real discrepancy between the estimates of Mr. Ingalls and the ones here presented.

TABLE 4D

AN ESTIMATE OF THE PURCHASING POWER OF THE BUSINESS SAVINGS OF CONCERNS OPERATING MINES, QUARRIES, AND OIL WELLS

A	B	C	D
Calendar year	Estimated total savings [a] (Millions)	Index of construction costs [b] (Base, 1913)	Equivalent of savings measured in new construction at prices of 1913 (Thousands) B ÷ C
1909	$ 55	.927	$ 59
1910	35	.953	36
1911	35	.945	37
1912	64	.983	66
1913	42	1.000	42
1914	34	.960	36
1915	94	.992	94
1916	209	1.194	175
1917	147	1.473	100
1918	79	1.499	53

[a] See Table 4C, Column G.

[b] Based upon Bureau of Labor Statistics indices, combined after weighting as follows: union scale of wages, 3; wholesale prices of metals and metal products, 2; lumber and building materials, 1.

The notable feature brought out by Tables 4C and 4D is the enormous increase in savings during the period immediately preceding the entrance of the United States into the war and the sharp decline thereafter. The figures in the last column of Table 4D show that this increase remains very large even after values are corrected for changes in the price level.

Table 4E summarizes the disbursements to the entrepreneurs and owners of property used in the mining industry.

It is evident that the revenues derived from mining increased materially during the latter years of the decade under consideration. Since this increase is presumably due primarily to war conditions, it is doubtful that it represents any permanent tendency. In fact available reports of mining corporations indicate that in 1919 and 1920 the earnings of many companies are much lower and in some instances heavy deficits have

The Census of 1909 indicates that our estimates are more likely to be too high than too low, for it shows total returns to entrepreneurs and investors of only $164,218,893; and from this amount an allowance for depletion must be deducted to arrive at the net gain. Both the dividends shown in Column C and the value of mineral output as estimated by the U. S. Geological Survey (see Table 4A, Column C) point to an increase from 1909 to 1913 of something less than one-third over the 1909 figures; and this increase corresponds with the estimates recorded in Column E. Corporate savings increased less rapidly than dividend payments. There appears, then, to be no sufficient reason for modifying the estimates here presented.

TABLE 4E

AN ESTIMATE OF THE TOTAL REVENUES DERIVED BY ENTREPRENEURS AND PROPERTY OWNERS FROM MINES, QUARRIES, AND OIL WELLS

A	B	C	D	E	F	G
Calendar year	Profits withdrawn [a] (Millions)	Total rents and royalties [b] (Millions)	Interest [c] (except on bank loans) (Millions)	Total revenues withdrawn by entrepreneurs and other property owners (Millions) B + C + D	Indices of prices of consumption goods used by well-to-do classes [d]	Value of revenues withdrawn at price of 1913 (Millions) E ÷ F
1909..	$ 88	$ 73	$45	$207	.965	$214
1910..	92	77	49	219	.983	222
1911..	95	74	56	225	.990	227
1912..	108	87	57	251	1.000	251
1913..	125	94	55	275	1.000	275
1914..	107	82	61	249	1.011	247
1915..	117	93	66	276	.999	276
1916..	192	136	64	392	1.081	363
1917..	282	193	62	537	1.225	438
1918..	230	214	68	512	1.406	364

[a] See Table 4C, Column E.
[b] See Table 4A, Column E.
[c] See Table 4B, Column E.
[d] Simple arithmetic average of indices for classes spending respectively $5,000 and $25,000 per annum.

occurred. There is also, of course, a question as to whether in calculating the profits reported, sufficient allowances were made for exhaustion of the properties. A failure to make such deductions would necessarily exaggerate the nominal profits to an equal amount.

§ 4c. Total Wages and Salaries

The share of the value product which requires the greatest amount of labor to estimate is that going to the employees. To arrive at figures having any validity whatever, it was necessary to depend mostly upon State reports and many of these are very incomplete. The process followed is summarized in Tables 4F and 4G for the coal mining industry while all other mines are dealt with in Table 4H.

TABLE 4F

AN ESTIMATE OF TOTAL WAGES AND SALARIES PAID IN THE BITUMINOUS COAL INDUSTRY[e] OF THE CONTINENTAL UNITED STATES

(Values in Millions of Dollars)

A	B	C	D	E	F	G	H
Calendar year	Estimated total payments to employees based upon reports from: Pennsylvania Department of Internal Affairs[a]	Kansas and West Virginia Bureau of Mines, and Ohio[c] estimates[b]	Michigan Department of Labor[d]	Index of total wages paid $B+C+\frac{D}{2}$	Total wages and salaries paid in Census years	Ratio of F to E	Total salaries and wages paid E × G
1909..	$277	$319	$ 457	$ 825	$290[f]	.3515	$290
1910..	337	348	538	954			335
1911..	328	338	561	947			333
1912..	370	365	593	1,032			363
1913..	398	409	681	1,148			404
1914..	355	359	630	1,029			362
1915..	319	357	634	993			349
1916..	434	416	723	1,212			426
1917..	613	547	889	1,604			564
1918..	865	634	1,211	2,104			740

[a] Product of the total value of bituminous coal produced in the U. S. (as shown by the *Statistical Abstract*), and the ratio of wage and salary payments to the value of the coal produced (as indicated by the Pennsylvania reports for each year).

[b] Obtained by calculating an average full time annual wage for miners in each of the three States, computing the mean of the three averages and multiplying it by the estimated number of full time employees in the United States as reported by the U. S. Bureau of Mines.

[c] Wages in the Hocking Valley field estimated from data in the *Monthly Labor Review* for December, 1919, pp. 225–226.

[d] The product of the number of tons mined (as reported by the U. S. Geological Survey) times the cost per ton of mining coal in Michigan. Since Michigan rates are apparently abnormally high, and that state is a relatively small producer, this estimate is only given one-half the weight of the other two.

[e] Includes the small fields in the West producing anthracite.

[f] To the $315,997,000 in wages reported in the Census of Mines and Quarries for 1909, p. 183, $159,000 has been added to cover the wages of Western anthracite mines, and $12,108,000 has been deducted to pay for the cost of powder purchased by the miners. Since the Census estimates that 4.72 per cent of the bituminous miners were already counted in manufacturing (Census of Mines, 1909, p. 17) the remainder just obtained has been multiplied by 0.9528.

TABLE 4G

AN ESTIMATE OF TOTAL WAGES AND SALARIES PAID IN THE ANTHRACITE FIELD AND IN ALL COAL MINES

A	B	C	D	E	F
Calendar year	Average payments to employees per long ton mined	Total long tons mined[e] (Thousands)	Total wages and salaries in the anthracite industry (Millions) B × C	Total wages and salaries in the bituminous industry[f] (Millions)	Total wages and salaries in the coal mining industry (Millions) D + E
1909	$1.240[a]	72,384	$ 90	$290	$380
1910	1.254[a]	75,433	95	335	430
1911	1.250[a]	80,771	101	333	434
1912	1.345[a]	75,323	101	363	464
1913	1.340[b]	81,719	109	404	513
1914	1.340[b]	81,090	109	362	470
1915	1.330[c]	79,460	106	349	455
1916	1.548[d]	78,195	121	426	548
1917	1.468[d]	88,939	131	564	695
1918	1.919[d]	88,238	169	740	909

[a] *Annual Report* of Pa. Secretary of Internal Affairs, Part III.
[b] Interpolated.
[c] *Annual Report* of Pa. Commissioner of Labor and Industry, Part I.
[d] Pa. Department of Internal Affairs, *Report on Productive Industries.*
[e] *Statistical Abstract of United States.*
[f] See Table 4F, Column H.

Statistics pertaining to the mines of stone, metals, and miscellaneous minerals are very scattered and disjointed; hence the estimates presented in Table 4H represent a combination pieced together from various sources. The fundamental assumption involved is that wages are roughly proportional to the value of output.

TABLE 4H

AN ESTIMATE OF TOTAL WAGES AND SALARIES FOR ALL EMPLOYEES OF MINES, QUARRIES, AND OIL WELLS EXCEPT COAL MINES

A	B	C	D	E	F	G	H
Calendar year	Index of daily wages [a]	Days of labor performed in metal mines and quarries of the U. S. [b] (Thousands)	Ratio of value of mineral products (except coal) to value of metal and quarry products [d]	Index of total wages paid in metal mines and quarries $\frac{B \times C \times D}{1,000}$	Estimated wages and salaries in Census year (Thousands)	Ratio of F to E	Total wages and salaries paid (Millions) $\frac{E \times G}{1,000}$
1909	.905	67,680 [c]	1.330	81 [e]	$232,148 [f]	2.851	$232
1910	.910	71,000 [c]	1.334	86			246
1911	.951	71,152 [b]	1.369	93			264
1912	.980	76,650 [b]	1.341	101			287
1913	1.000	81,220 [b]	1.378	112			319
1914	.953	63,242 [b]	1.447	87			249
1915	.998	67,333 [b]	1.418	95			272
1916	1.153	80,673 [b]	1.307	122			347
1917	1.387	79,083 [b]	1.333	146			417
1918	1.568	72,088 [b]	1.382	156			445

[a] Estimated on the basis of wages in the iron mines of Itasca and St. Louis Counties Minn. (*Biennial Reports* of Minn. Bureau of Labor), in miscellaneous mines in Pa. (Reports of Secretary of Internal Affairs and of Commissioner of Labor and Industry), in the gold mines of the U. S. (U. S. Bureau of Mines, Bulletin 144, p. 62), and in Tenn. metal mines and quarries (*Annual Reports* of Tenn. Mining Department).

[b] See U. S. Bureau of Mines, *Technical Papers* 245 and 252.

[c] Estimated as being proportional to the value of metal and quarry products.

[d] Based upon reports of the *U. S. Geological Survey* and the *U. S. Census of Mines and Quarries*.

[e] 81 thousands equals the product of B, C, and D in 1909.

[f] $43,716,537, duplicated in the Census of Mfg., (see *Census of Mines and Quarries*, 1909, p. 17) has been added to $379,720,000, the total wages in coal mining (see Table 4G), and the sum has been deducted from $655,584,467, the amount reported in the *Census of Mines and Quarries* for 1909.

§ 4d. Number of Employees and Average Earnings

We are interested not only in the total wages and salaries paid, but also in the total number of persons required to operate the mines, quarries, and oil wells of the United States.

The United States Bureau of Mines in connection with its statistics of mine accidents shows the number of men at work in the principal classes of mines and quarries each year. These numbers have been compared with the numbers in 1909 working in the maximum month in each industry as shown by the United States Census of Mines and Quarries. After considering these quantities and making allowances for the number of workers in miscellaneous industries not covered by the reports of the Bureau of

Mines, the figures entered in Table 4I have been arrived at. They must be regarded merely as rough approximations to the truth.

TABLE 4I

TOTAL NUMBER OF EMPLOYEES ATTACHED TO THE INDUSTRY AND TOTAL AND AVERAGE WAGES PAID IN THE MINES, QUARRIES, AND OIL WELLS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I	J
Calendar year	Wages and salaries (Millions)			Employees attached to industry[c] (Thousands)			Ratio of total share of employees to total wages and salaries[d]	Total share of employees (Millions) 1.050×D	Average annual compensation per employee I ÷ G
	Of coal miners[a]	Of other miners[b]	Of all miners B + C	Coal mines	Other mines	All mines E + F			
1909 ..	$380	$232	$ 612	725	348	1,073	1.050	$ 643	$ 599
1910 ..	430	246	676	740	366	1,106		711	642
1911 ..	434	264	698	751	381	1,132		733	647
1912 ..	464	287	752	759	391	1,150		790	687
1913 ..	513	319	832	764	395	1,159		874	755
1914 ..	470	249	719	767	396	1,163		755	649
1915 ..	455	272	727	771	392	1,163		764	656
1916 ..	548	347	894	774	380	1,154		939	814
1917 ..	695	417	1,112	776	365	1,141		1,169	1,025
1918 ..	909	445	1,354	779	329	1,108		1,422	1,283

[a] Table 4G, Column F.
[b] Table 4H, Column H.
[c] For derivation, see text.
[d] Part of mining is done under contract, the *Census of Mines and Quarries*, for 1909, p. 21, showing $30,690,000 for contract work, being 5 per cent of the wage bill of 612 millions. The total pay of employees evidently amounts therefore to 105 per cent of the wages and salaries paid.

§ 4e. Total Net Value Product and Share of Employees

We are now in a position to estimate the total net value product of the industry, and the estimates thereof for the various years are recorded in Table 4J.

The results indicate that the share of the value product going to the employees tends to be a little less than three-fourths of the whole and that their relative share diminished materially in 1916 and 1917, but showed signs of recovery in 1918.

To some of the employees, however, the average purchasing power of their annual earnings is a matter of as much interest as is the relative size of their share of the value product.[1] The employers' direct interest, on

[1] Dr. H. W. Laidler, a Director of the Bureau says: "An increasing number of progressive employees feel that the question of the proportion of the return to employees is of greater importance than the actual size of that return."

TABLE 4J

AN ESTIMATE OF THE NET VALUE PRODUCT OF THE MINES, QUARRIES, AND OIL WELLS OF THE CONTINENTAL UNITED STATES AND THE PER CENT THEREOF GOING TO THE EMPLOYEES

Calendar year	Millions of dollars					
	A	B	C	D	E	F
	Rents and royalties [a]	Profits [b] (including savings)	Interest on funded debt [c]	Compensation of employees [d]	Total net value product A + B + C + D	Per cent of Value product going to employees $\frac{100\ D}{E}$
1909....	$ 73	$144	$45	$ 643	$ 904	71.0
1910....	77	127	49	711	964	73.7
1911....	74	130	56	733	993	73.8
1912....	87	173	57	790	1,103	71.4
1913....	94	168	55	874	1,191	73.4
1914....	82	141	61	755	1,039	72.7
1915....	93	211	66	764	1,133	67.4
1916....	136	402	64	939	1,541	60.9
1917....	193	429	62	1,169	1,853	63.1
1918....	214	309	68	1,422	2,013	70.6

[a] See Table 4A, Column E.
[b] See Table 4C, Column H.
[c] See Table 4B, Column E.
[d] See Table 4I, Column I.

the other hand, centers mainly upon questions pertaining to the efficiency of the workers in producing output. Table 4K throws light upon the situation in both these connections.

§ 4f. The Mineral Output Compared to Earnings and Population

As a measure of the output of the mining industry, the index of physical production prepared by Professor Edmund E. Day has been used, as it is presumably the best criterion available. It is possible that it exaggerates a trifle the expansion of the mining industry during the war years, for it is based upon data concerning the production of leading minerals, and some of the minor industries producing materials for building apparently declined while the larger fields were expanding. However, the minerals covered include such a large proportion of the total that it is improbable that any error from this source is large enough to be a matter of serious moment and, at any rate, its effect would not be either continuous or cumulative; hence, it seems that the figures are amply accurate for the purposes at hand.

TABLE 4K

AN ESTIMATE OF THE PURCHASING POWER OF THE EARNINGS OF THE AVERAGE EMPLOYEE COMPARED WITH THE AVERAGE OUTPUT PER EMPLOYEE

A	B	C	D	E	F	G
Calendar year	Average annual earnings per employee[a]	Index of prices of goods purchased by workers[b]	Average earnings at prices of 1913 $\frac{B}{C}$	Index of physical production of minerals[d]	Total number of employees attached to industry[c] (Millions)	Index of output per employee $\frac{E}{F}$
1909....	$ 599	.955	$627	675	1.073	629
1910....	642	.978	656	717	1.106	648
1911....	647	.984	658	692	1.132	611
1912....	687	.994	691	771	1.150	670
1913....	755	1.000	755	809	1.159	698
1914....	649	1.01	643	721	1.163	620
1915....	656	1.03	637	810	1.163	696
1916....	814	1.10	740	950	1.154	823
1917....	1,025	1.29	795	986	1.141	864
1918...	1,283	1.58	812	995	1.108	898

[a] See Table 4I, Column J.
[b] Bureau of Labor Statistics index extended back by special investigation.
[c] See Table 4I, Column G.
[d] Day, Edmund E., Review of Economic Statistics, 1921. *An Index of the Physical Volume of Production*, p. 22; multiplied by a suitable factor to make comparison easy.

Table 4K shows a sharp gain in the purchasing power of the average miner's wage beginning with the year 1916. At the same time, a marked increase in physical output is noticeable; in fact the production appears to have increased to a considerably greater extent than the earnings. Further investigation would be necessary in order to determine whether the larger output was the result mainly of a smaller number of days lost per year, more strenuous effort put forth, or an improvement in mining machinery.

Another subject of general interest is the relation between the output of minerals and the population of the country.

According to Professor Day's index, our mineral output increased during the decade far more rapidly than population. This fact is brought out in Table 4L.

Table 4L indicates that the exploitation of our mineral resources is proceeding more rapidly than is our growth in population. The large increase in output in 1916, 1917, and 1918 presumably was called forth mostly in response to war requirements and hence may have added little or nothing to the permanent national industrial equipment.

TABLE 4L

THE RELATIVE CHANGES IN THE PER CAPITA PRODUCTION OF MINERALS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Population of the United States		Day's index of physical production of minerals [b]	Index of per capita physical production of minerals $\frac{100D}{C}$
	Thousands [a]	Index		
1909	90,370	100.0	100.0	100.0
1910	92,229	102.1	106.4	104.2
1911	93,811	103.8	102.6	98.8
1912	95,338	105.4	114.4	108.4
1913	97,278	107.7	119.9	111.3
1914	99,194	109.8	107.0	97.4
1915	100,428	111.1	120.1	108.1
1916	101,722	112.5	140.9	125.2
1917	103,059	114.1	146.4	128.3
1918	104,182	115.3	147.6	128.0

[a] See Sec. 2a.

[b] Adjusted from the figures on p. 22 of Edmund E. Day's, *An Index of the Physical Volume of Production*, Harvard Committee on Economic Research, 1921.

It is well to keep in mind that while an increase in mineral output is a necessary concomitant of industrial progress, it nevertheless is far from representing a clear gain since it necessarily involves a diminution in the inventory of resources upon which the nation must depend in the future.

CHAPTER 5

FACTORY PRODUCTION

(Covering that part of the private Manufacturing Industry included in the totals presented by the United States Census of 1914.)

§ 5a. Importance of the Industry

This field covered in 1900 more than 90 per cent [1] of the entire manufacturing industry,[2] and in 1914 the operations carried on therein increased by nearly ten billions of dollars, the value of the materials worked upon. This, then, is a division of the first magnitude, and it is highly important that all estimates therefor be made with the highest practicable degree of accuracy.

Fortunately, statistics of manufacture of different types are abundant. While it is, of course, impossible to obtain an analysis from year to year of the data for the United States as a whole, it seems feasible to make a fairly close estimate of the value of the total output of the factories of the nation for each year since 1909.

§ 5b. The Gross Value of the Products

The distinction between the gross value of the output and the net value product of the manufacturing industry is both theoretically sharp and practically important. The gross value consists merely of the summation of the values of the respective outputs of all the different factories. This evidently includes a great amount of duplication, for one factory ordinarily works on the materials turned out by another plant. The net value product, on the other hand, is the added value resulting from the services of persons and material things employed in the manufacturing industry.

The plan adopted for estimating the gross annual value of the output is as follows:—

1. Forty-four indicators have been selected, each believed to represent fairly well the course of production in some particular branch of the manufacturing industry. Except in two cases, only those indicators have been used for which annual figures are available for each year from 1909 to

[1] Compare with the Census of Manufactures for 1900, Volume 7, Part I, page xxxvii.
[2] The hand trades are included in the general field of manufacturing but are not enumerated by the Census.

1918 inclusive. In these two instances, adjustments have been made for the years for which information is lacking.

2. Every indicator has been reduced to the form of an index number based upon the output for 1909.

3. Each index number has been multiplied by a weight representing the value of the output in 1914 in the field which the indicator represents. By summating the products and dividing by the sum of the weights, an average index number has been obtained for each year. These average index numbers presumably portray with reasonable accuracy the changes in production taking place from year to year in the manufacturing field.

While the indicators chosen seem to give a correct picture of the cyclical fluctuations in manufacturing, their trend diverges slightly from that indicated by the Censuses of 1909, 1914, and 1919—in other words, the rate of growth of the manufacturing industry of the country as a whole seems to be a trifle greater than the rate of growth of the sample industries chosen. While the divergence is so small as to be relatively unimportant, the accuracy can presumably be improved by making the trend conform to that indicated by the Census figures. This aim has been accomplished in the following manner:—

The respective ratios of the Census figures to the estimated indices have been ascertained for 1909, 1914, and 1919, and these ratios have been considered the determining points of a smooth curve. A ratio has been read from this smooth curve for each year from 1909 to 1918. The estimated average indices for the various years have been multiplied by the corresponding ratios, and the products thus obtained are believed to represent close approximations to the gross values, on the Census basis, of manufactured products turned out for the various years. The operations described are indicated in Table 5B.

In the computation of the average index of output mentioned in paragraph 3, the indicators listed in Table 5A were used with the weights there stated. The general source of the information is cited in each case.

In some instances, the quantity rather than the value of the product is given in the report cited. In such cases, the quantity has been multiplied by the best obtainable price figure for the same year, and the product thus derived has been used to represent the fluctuations in the average value of the gross output. The citations in Table 5A show the origin of both price and quantity data when both are used. Volume and page references have not been given because it seems unnecessary to burden this report with such a mass of detail.

Each field of manufacture has been weighted in proportion to the gross "Value of Products" as shown in the Abstract of the Census of Manufactures for 1914. This general weight has been apportioned among the

TABLE 5A

THE SOURCES OF INFORMATION, THE INDICATORS USED, AND THE WEIGHTS ASSIGNED IN COMPUTING AN AVERAGE INDEX OF GROSS OUTPUT

Source of Information	Weight	Indicator
FOOD AND KINDRED PRODUCTS.		VALUE OF
Yearbook of U. S. Department of Agriculture.	675	Animal Products.
Chase, Stephen, *Production of Meat in U. S.*; Food Administration, Bureau of Animal Industry Reports; *Yearbooks* of Department of Agriculture; and *Statistical Abstract of U. S.*	1,293	Meat Produced.
Statistical Abstract of U. S.	770	Sugar Consumed.
Statistical Abstract of U. S.	193	Coffee Consumed.
Statistical Abstract of U. S.	48	Crude Chocolate Imported.
Statistical Abstract of U. S.	1,639	Wheat Retained for Consumption.
Statistical Abstract of U. S. and *Yearbook* of Dept. of Agriculture.	289	Butter Receipts at five large cities.
TEXTILES AND THEIR PRODUCTS. *Statistical Abstract of U. S.*	444	Unmanufactured Silk Imported.
Statistical Abstract of U. S.	1,434	Cotton Manufactures.
Statistical Abstract of U. S. and *Bulletin 200*, U. S. Bureau of Labor.	649	Woolen Manufactures.
Massachusetts *Statistics of Manufactures.*	444	Men's Clothing Manufactured in Massachusetts.
Massachusetts *Statistics of Manufactures.*	444	Women's Clothing Manufactured in Massachusetts.
IRON AND STEEL AND THEIR PRODUCTS. *Statistical Report* of American Iron & Steel Institute.	3,223	Pig Iron Consumed plus Crude Steel and Finished Rolled Products produced.
LUMBER AND ITS REMANUFACTURES. U. S. Census, *Statistical Abstract of U. S.*; *Bulletins 673* and *788* of Department of Agriculture.	1,184	Lumber Product of All Mills.
U. S. Census	256	Lumber not Used in Building.
Massachusetts *Statistics of Manufactures.*	160	Furniture Produced in Massachusetts.

TABLE 5A—*Continued*

Source of Information	Weight	Indicator
LEATHER AND ITS FINISHED PRODUCTS.		VALUE OF
Massachusetts *Statistics of Manufactures.*	575	Boots and Shoes Produced in Mass.
Massachusetts *Statistics of Manufactures.*	298	Leather Produced in Massachusetts.
Massachusetts *Statistics of Manufactures.*	155	Cut Stock and Findings Produced in Mass.
Massachusetts *Statistics of Manufactures.*	77	Belting Leather Produced in Massachusetts.
PAPER AND PRINTING.		
Mass. *Statistics of Manufactures.*	99	Paper Boxes Produced.
Mass. *Statistics of Manufactures.*	15	Envelopes Produced.
Mass. *Statistics of Manufactures.*	204	Paper and Wood Pulp.
Mass. *Statistics of Manufactures.*	44	Miscellaneous Paper Goods.
Mass. *Statistics of Manufactures.*	525	Newspaper and Periodical Publishing.
Annual Report of South Carolina Commissioner of Agriculture; Commerce & Industries.	146	Printing & Publishing.
Bulletin 758, Department of Agriculture; U. S. Census Bulletins on *Forest Products; Statistical Abstract of U. S.*	423	Pulp Wood Consumption of U. S.
LIQUORS AND BEVERAGES.		
Statistical Abstract of U. S.	23	Domestic Wine Consumed.
Statistical Abstract of U. S.	509	Fermented Liquors Produced.
Statistical Abstract of U. S.	124	Whiskey Produced.
Statistical Abstract of U. S.	116	Commercial Alcohol Produced.
CHEMICALS, STONE, CLAY, AND GLASS.		
Statistical Abstract of U. S.	1,778	Mineral Products other than Coal and Metals.
Statistical Abstract of U. S.	262	Alcohol Produced.
Statistical Abstract of U. S.	157	Sulphuric Acid Produced.
Statistical Abstract of U. S.	261	Cottonseed Oil and Cake Produced.
Moody's *Analyses of Investments,* 1919.	157	Gross Revenues, Dupont Powder Company.

TABLE 5A—*Continued*

Source of Information	Weight	Indicator
METALS OTHER THAN IRON. *Statistical Abstract of U. S.*	1,417	VALUE OF Metallic Products other than Pig Iron.
TOBACCO MANUFACTURES. *Statistical Abstract of U. S.* and *Yearbook*, Dept. of Agriculture.	490	Estimated Value of Tobacco Manufactures.
VEHICLES FOR LAND TRANSPORTATION. National Auto. Chamber of Commerce,—*Facts & Figures of the Automobile Industry Manual of Statistics*, 1918.	238	Gross Earnings American Car & Foundry Company.
Poor's *Manual of Industrials;* Moody's *Analyses of Investments.*	10	Gross Sales, Brill & Company.
RAILROAD REPAIR SHOPS. Interstate Commerce Commission. *Statistics of Railways.*	553	Total Maintenance of Railroad Equipment.
PRIVATE SHIPBUILDING. Mass. *Statistics of Manufactures.*	186	Shipbuilding in Massachusetts.
PAVING MATERIALS. Geological Survey—*Mineral Resources of U. S.*	36	Asphalt Produced in the U. S.

various indicators in accordance with the share of the total industry that appears to be best typified by the indicator in question. Thus, the manufacturing of "Food and Kindred Products" is given a weight of 4,817 because products of that type in the United States in 1914 were valued at that many millions of dollars. This entire weight is divided among seven indicators. Although the seven indicators combined manifestly represent directly but a fraction of the food manufacturing field, the sum of their weights is, nevertheless, made to total 4,817, so that each of the great divisions of manufacturing may be represented in proportion to its importance in making up the average index.

There is ground for contending that the weighting should be based upon the "Value Added by Manufacture" rather than upon the "Value of Products." Since, however, the available indicators nearly all represent the gross value of output, and since an index of gross output is the end in view, it has been decided to use this gross value as a basis of weighting. Obviously, no two investigators would choose weights according to exactly the same standard but, as Bowley demonstrates in his *Elements of Statistics*, when the number of variables to be averaged is rather large, the exact size

of the weights is a matter of secondary importance. It seems probable, therefore, that the weights chosen answer the purpose sufficiently well.

Evidently many of the criteria used measure the output of the manufacturing industry only indirectly. For example, the value of meat produced is used to measure the magnitude of the slaughtering and meat packing industry; the amount of coffee imported indicates the extent of coffee roasting and grinding; and the imports of raw silks give an index of the activity of the silk factories. It is doubtful if direct records of meat packing, coffee grinding, and silk weaving would give much more representative indices of the value of the output. Their superiority would presumably be but slight at best.

The final steps in the computation of the index of gross output for the Continental United States are shown in Table 5B.

TABLE 5B

THE ESTIMATED GROSS VALUE OF THE GOODS TURNED OUT BY FACTORIES COVERED BY THE PRINCIPAL REPORT OF THE CENSUS OF 1914

For the Continental United States

A	B	C	D	E	F
Date	Indices of annual output computed from forty-four indicators [d]	Value of gross output as shown by the census (Millions)	Ratio of census output to estimated index of output C ÷ B	Estimated ratio of actual output to indices of output (Hundreds)	Estimated value of gross output (Millions) B × E
1909....	100.0	$20,672 [b]	206,721	2067 [c]	$20,672 [b]
1910....	105.0			2072 [a]	21,770
1911....	102.5			2078 [a]	21,300
1912....	115.2			2088 [a]	24,050
1913....	123.2			2095 [a]	25,810
1914....	115.0	24,246 [b]	210,830	2108 [c]	24,246 [b]
1915....	133.7			2126 [a]	28,430
1916....	202.8			2149 [a]	43,580
1917....	261.7			2181 [a]	57,080
1918....	284.2			2217 [a]	63,000
1919....	278.1	62,588 [e]	225,100	2251 [c]	62,588 [e]

[a] Interpolated along a smooth curve.
[b] *Abstract of United States Census of Manufactures*, 1914, p. 16.
[c] See Column D.
[d] For list of indicators, see Table 5A.
[e] Preliminary bulletin of *Census of Manufactures* for 1919, May 24, 1921.

The representative character of the average index computed from the forty-four indicators is reasonably well established by the entries in Column D, which show that the ratios of the Census totals to the index are nearly the same in 1909 and 1914 and not greatly different in 1919. If

they were fairly reliable criteria for that ten-year period, there is every reason to suppose that they are equally dependable for the intervening years. It seems safe to assume, therefore, that the figures presented in Column F show rather accurately for each year the gross value of the output of that part of the manufacturing industry of the United States covered by the quinquennial Census.

§ 5c. The Division of the Net Value Product in the Census Years

Since, for reasons previously stated, the size of the gross output does not measure accurately the productiveness of the manufacturing industry itself, this last quantity must be arrived at by ascertaining the increase in value brought about by the operations of manufacture. This increase in value is eventually divided among the entrepreneurs, employees, and outside investors in the industry.

From the Census, it seems possible to estimate, with a moderate degree of accuracy, the shares of each of the classes just mentioned. The share of the entrepreneurs is assumed to equal the value of the gross product less all expenses and an allowance for depreciation. The Census Bureau has made no estimates of the depreciation occurring in the factories of the country. Some writers contend that a depreciation allowance has no basis of fact; in other words, that it is a mere bookkeeping device used to conceal accumulated profits. According to this point of view, manufacturing plants do not depreciate but, as a rule, continually improve in quality, owing to the replacement of obsolete machinery by modern equipment, and hence, not only should there be no depreciation account, but large sums that have been charged to repairs ought to have been carried to surplus. Opponents of this view may admit the physical improvement of the plant but nevertheless believe that depreciation accounts are necessary to cover the large losses which occur through bad investments.

A little consideration will force one to the conclusion that this issue resolves itself into the question as to whether surplus accounts as reported are too large or too small. Since manufacturing concerns usually make depreciation allowances in their accounts before computing their annual surpluses, and since the surpluses arrived at by their accounting systems seem, on the average, to be correctly reported,[1] it follows that corresponding depreciation allowances should be applied to the Census figures in order to obtain the correct amounts for profits.

In order to obtain a reasonable basis for estimating depreciation, the allowances for this purpose made by a large number of manufacturing corporations (as reported in Moody's *Manual*) were summated for 1914, and the sums were compared with the aggregate total nominal investment

[1] For discussion of this point see § 1g of this volume.

in the selected concerns. The depreciation allowance amounted in 1914 to 2.927 per cent. A separate estimate for 1909 was not calculated for the

TABLE 5C

THE APPROXIMATE DISTRIBUTION OF THE VALUE PRODUCT OF THAT PART OF THE MANUFACTURING INDUSTRY INCLUDED BY THE CENSUS BUREAU IN THE TOTALS FOR 1909 AND 1914

Item	Millions of dollars			
	Census of			
	1909		1914	
Value of Gross Output		$20,672[a]		$24,246[b]
Expenses:				
Services:				
Salaries	$ 939[a]		$ 1,288[b]	
Wages	3,427[a]		4,078[b]	
Interest Paid to Banks	52[h]		47[h]	
Materials	12,143[a]		14,368[b]	
Miscellaneous	1,946[a]		2,344[f]	
Depreciation	539[c]		667[d]	
Total Expenses		19,046		22,792
Share of Entrepreneurs and Interest on Funded Debt		$ 1,626		$ 1,454
Distribution of Value of Product:				
Share of Employees:				
Wages and Salaries	$4,366[a]		$5,366[b]	
Payments to Workers for Contract Work[e]	44[g]		50[b]	
Total Share of Employees		$4,410		$5,416
Share of Entrepreneurs and Other Investors:				
Gross Profits and Bond Interest	1,626		1,454	
Rent of Factories	107[g]		140[b]	
Other Rent and Royalties	106[i]		141[i]	
Total		1,839		1,735
Total Value Product of Manufacturing Industry		$ 6,249		$ 7,151

[a] *Abstract of the U. S. Census* for 1910, p. 438.
[b] *Abstract of the U. S. Census of Manufactures*, 1914, pp. 516–519.
[c] 2.927 per cent of the capital of $18,428,270,000.
[d] 2.927 per cent of the capital of $22,790,979,937.
[e] One-fourth of amount paid for contract work.
[f] Includes $1,563,000,000 estimated "Other Miscellaneous" expenses not recorded by the Census of 1914. Missing item assumed to constitute same ratio to other expenses as in 1909, namely 7.63 per cent; total expenses reported by 1914 Census equal $20,515,000,000.
[g] *U. S. Census of Manufactures* for 1910, Vol. VIII, pp. 518–520.
[h] Estimated from a study of the reports (recorded in Moody's *Manual*) of sixty-one representative manufacturing corporations.
[i] Arbitrarily assumed that other rents and royalties paid to private parties are just as large as the reported rent of factories.

reason that it was felt that, at that date, the custom of reporting depreciation in the published accounts had not developed sufficiently to make the data reliable. For this reason, the same percentage was used for 1909 as for 1914, and in each case, 2.927 per cent of the total capitalization, as reported by the Census, has been deducted from gross receipts as a depreciation allowance.

It is evident that the entries in Table 5C are not exact but are subject to a considerable degree of error. The depreciation allowance, as has already been explained, is only an approximation. The assumption that 25 per cent of the payments for contract work are virtually wages has been made after going through the list of industries given in the 1914 Census and selecting those like the clothing industry in which the payments are presumably made for work done at home by members of the working class. Such a rough method of estimate is perhaps amply good when one considers the relatively small size of the items involved. Nevertheless, an appreciable amount of error is likely to creep in at this point.

The items for rent and royalties are included in the items making up the value product ascribed to the industry on the assumption that these payments are made to property owners not represented in any other section of this estimate. It has been assumed, for example, that few of the buildings leased for factory purposes are owned by other manufacturing concerns. Concrete evidence along this line is lacking; hence, guesses are substituted. The size of the item entitled "Other Rents and Royalties" in 1914, is also unknown and the figure inserted may be far from the truth. The doubtful items just discussed are not large enough to make any considerable relative change in the product, even if the errors in these minor items are a maximum and all in the same direction. Such errors might, however, vitiate to some extent the accuracy of the figures purporting to show the divisions of the net product between employees and other claimants. As a matter of fact, the errors probably cancel each other to some extent; hence, it is hoped that, for the Census years, the apportionment of the value product between employees and the other claimants thereto is exact enough to answer the needs of most students of the subject. Census figures exist, however, only for three years in the period. What changes took place between those dates?

§ 5d. Mode of Estimating the Net Value Product for Intercensal Years

Data upon which one can base estimates as to the changes occurring from year to year in the apportionment of the value product between the different classes of claimants are by no means abundant. Iowa issues statistics concerning its manufacturing industries, but only biennially. Since that State is devoted primarily to agriculture and only incidentally

to manufacturing, and since half the years are missing, its reports have not been utilized. South Carolina and Pennsylvania publish annual reports. In both of these States, a considerable share of the smaller establishments apparently did not report in the earlier years. Nevertheless, the data from these States are valuable, since South Carolina well represents the extensive textile business of the South, while Pennsylvania stands for the iron and steel industry, the products of which played such an important part in the recent war. It is Massachusetts, however, which furnishes the most complete and probably the most accurate statistics of manufactures compiled by any State in the Union. Unfortunately, its manufactures, while extremely varied, consist to a disproportionate degree of shoes and textiles, the latter being already represented by the South Carolina data. In order, therefore, to secure the maximum advantage from the existence of such a useful body of data, it was deemed best to re-weight the Massachusetts figures in a manner which makes the different industries for that State have the same relative rank as the like industries in the nation as a whole. The actual process used is as follows:—

Those Massachusetts industries have been chosen which best represent the given field of production. All the items in the data for the specified Massachusetts industry have been multiplied by the ratio of the 1914 value of the output in the United States to the value of the output in the chosen Massachusetts industry in the same year. The sums of the resulting products are thus made comparable in size to the corresponding aggregates for the country as a whole. The totals obtained in this way from the Massachusetts data show the relative changes that would have occurred from year to year in the gross value of output, in the stock of materials used, and in the amount of wages paid during the year, if each of these items in each of the great fields of the manufacturing industry in the United States as a whole had changed at the same rate as did the corresponding fields in Massachusetts.

Owing to the less detailed nature of the information from Pennsylvania and South Carolina, it was not deemed worth while to re-weight the figures for those states in the same manner. For the reasons just stated, in those instances in which the figures for the three States have been combined, the Massachusetts figures have been weighted somewhat more heavily than the relative size of its manufacturing industries would apparently warrant. In this manner, indices and ratios have been derived which have been used as a basis for estimating figures for intercensal years.

§ 5e. The Share of the Employees

In attempting to estimate the amount paid to employees in the form of salaries and wages the assumption has been made that variations in the

TABLE 5D

ESTIMATE OF THE TOTAL OF WAGES AND SALARIES PAID BY THAT PART OF THE MANUFACTURING FIELD COVERED BY THE CENSUS OF 1914 IN ITS PRINCIPAL REPORT

(For the Continental United States)

A	B	C	D	E	F	G	H	I	J
	Ratio to gross value of output in manufactures of								
Calendar year	Wages and salaries in Pa.	Wages in S. C.[d]	Wages in Mass.[e]	Weighted average of preceding $\frac{10B+C+15D}{26}$	Wages and salaries in the U. S.	Ratio of F to E	Ratio of wages and salaries to gross output in the U. S. G × E	Gross value of output of factories of United States[j] (Millions)	Wages and salaries paid by factories of U. S. (Millions) H × I
1909.....	.1936[a]	.1881	.2020	.1982	.2112[f]	1.066[h]	.2112	$20,672	$ 4,366
1910.....	.2114[a]	.1643	.2041	.2054		1.071[i]	.2200	21,770	4,790
1911.....	.2162[a]	.1660	.2073	.2091		1.079[i]	.2256	21,300	4,805
1912.....	.2082[a]	.1852	.2010	.2032		1.087[i]	.2208	24,050	5,310
1913.....	.2165[b]	.1728	.2044	.2078		1.098[i]	.2282	25,810	5,890
1914.....	.2051[b]	.1825	.1989	.2007	.2213[g]	1.103[h]	.2213	24,246	5,366
1915.....	.1892[b]	.1963	.1976	.1943		1.066[i]	.2072	28,430	5,892
1916.....	.1552[c]	.1646	.1910	.1762		1.099[i]	.1937	43,580	8,442
1917.....	.1543[c]	.1438	.1798	.1686		1.094[i]	.1845	57,080	10,530
1918.....	.1837[c]	.1369	.1819	.1809		1.089[i]	.1970	63,000	12,410
1919.....							.2121[k]	62,588[k]	13,273[k]

[a] *Annual Reports* of Secretary of Internal Affairs of Pennsylvania, Part III.
[b] *Annual Reports* of Commissioner of Labor and Industry, Pennsylvania, Part I.
[c] *Report on Productive Industries*, Pennsylvania Department of Internal Affairs.
[d] South Carolina *Yearbooks*, and *Annual Reports* of the Commissioner of Agriculture, Commerce, and Industries, Labor Division.
[e] *Statistics of Manufactures* of Massachusetts.
[f] *U. S. Census of Manufactures*, 1910, Volume VIII, p. 518.
[g] *Abstract of Statistics of Manufactures* for 1914, pp. 29 and 516.
[h] Computed by division.
[i] Interpolated along a smooth curve.
[j] See Table 5B.
[k] Calculated from the preliminary reports of the *Census of Manufactures* for 1919.

ratio of wage payments to gross value of output are satisfactory as criteria to be used in interpolation. Only preliminary figures for the 1919 Census are as yet available. When this Census is complete, it will be possible to secure a slightly higher degree of accuracy in all estimates after 1914, but it is believed that the present indices for these last few years are approximately correct. The procedure is recorded in Table 5D.

Work done at home under the contract system, a procedure frequently followed in the clothing industry for example, is often akin to piece work in a factory. The contractors in such instances, furnish no property of moment and are virtually wage earners. As previously stated, the basic estimates as to the extent of such work are very crude. Table 5E is constructed on the principle that contract work has formed a very slowly but steadily varying ratio to payments for wages and salaries. Since the amounts dealt with are relatively very small, errors in the results are of little consequence.

TABLE 5E

AN ESTIMATE OF THE TOTAL SHARE OF THE EMPLOYEES IN THE NET VALUE PRODUCT OF THAT PART OF THE MANUFACTURING FIELD COVERED BY THE CENSUS OF 1914

A	B	C	D	E
Year	Estimated total of wages and salaries[a] (Millions)	Estimated payments for labor done under contract (Millions) (One-fourth of census items)	Estimated ratio of all payments for labor to sum of wages and salaries $\frac{B+C}{B}$	Estimated sum of all payments for labor (Millions) $B \times D$
1909	$ 4,366	$44.7[b]	1.0102[d]	$ 4,410
1910	4,790		1.0100[e]	4,838
1911	4,805		1.0097[e]	4,852
1912	5,310		1.0096[e]	5,361
1913	5,890		1.0095[e]	5,946
1914	5,366	49.7[c]	1.0093[d]	5,416
1915	5,892		1.0090[e]	5,945
1916	8,442		1.0089[e]	8,517
1917	10,530		1.0086[e]	10,621
1918	12,410		1.0085[e]	12,515
1919	13,273		1.0083[e]	13,383

[a] See Table 5D.
[b] *U. S. Census of Manufactures*, 1910, Vol. VIII, pp. 518–519.
[c] *Abstract of the Census of Manufactures*, 1914, pp. 516–517.
[d] Computed.
[e] Interpolated along a curve.

A complete estimate would include in Table 5E payments made to employees as pensions or as damages for injuries suffered. However, no information is at hand concerning these amounts, and, since they are not large enough to be of serious moment, no adjustments have been made for these missing quantities.

In order to estimate the average amount of money received by an employee as wages or salaries during each year, it is necessary first to calculate the number of employees attached to the industry. The estimates of this number have been made in accordance with the principles laid down in Sec. 2d. Tables 5F and 5G set forth the conclusions derived.

TABLE 5F

THE ESTIMATED NUMBER OF EMPLOYEES ENGAGED IN THAT PART OF THE MANUFACTURING FIELD INCLUDED IN THE PRINCIPAL TABLES OF THE 1914 CENSUS

A	B	C	D	E	F	G
Calendar year	Number employed as shown by census	Index of number employed in factories of various states[b]	Ratio of B to C	Estimated number actually at work (Thousands) C × D	Estimated fraction of employees attached to industry actually at work[e]	Estimated number of employees attached to industry (Thousands) E ÷ F
1909	7,405,313[a]	969	7,642[c]	7,405	.958	7,730
1910		955	7,717[d]	7,370	.944	7,810
1911		964	7,780[d]	7,500	.941	7,970
1912		1,009	7,859[d]	7,930	.968	8,190
1913		1,007	7,944[d]	8,000	.949	8,430
1914	8,000,554[a]	1,000	8,001[c]	8,001	.910	8,790
1915		982	8,139[d]	7,993	.878	9,102
1916		1,140	8,296[d]	9,457	.969	9,757
1917		1,203	8,429[d]	10,140	.975	10,395
1918		1,220	8,590[d]	10,480	.961	10,905
1919	10,374,000[f]	1,188	8,732[c]	10,374	.934	11,017

[a] *Abstract of Census of Manufactures*, 1914, p. 428.
[b] Estimates for Massachusetts, South Carolina, New York, Pennsylvania, and Wisconsin for years after 1914. For years 1909 to 1912, only Massachusetts and South Carolina furnished reports.
[c] Computed by division.
[d] Interpolated along a smooth curve.
[e] See Section 2d for method of estimate.
[f] Preliminary estimate by Mr. E. F. Hartley, Statistician for the U. S. Census of Manufactures.

From Table 5G, it appears that the economic welfare of the employees in this line of production has improved quite decidedly since 1914. It is also a fact of interest that the average number of employees increased rather rapidly between 1915 and 1918.

TABLE 5G

THE ESTIMATED AVERAGE COMPENSATION RECEIVED BY THE EMPLOYEES ATTACHED TO THAT PART OF THE MANUFACTURING FIELD INCLUDED IN THE PRINCIPAL TABLES OF THE 1914 CENSUS

A	B	C	D	E	F
Calendar year	Total compensation for labor [a] (Millions)	Estimated number of employees attached to industry [b] (Thousands)	Average annual compensation per employee B ÷ C	Index of prices of goods consumed by manual and clerical workers [c]	Purchasing power of average annual compensation at prices of 1913 D ÷ E
1909 ...	$ 4,410	7,730	$ 571	.955	$597
1910 ...	4,838	7,810	620	.978	634
1911 ...	4,852	7,970	609	.984	619
1912 ...	5,361	8,190	655	.994	659
1913 ...	5,946	8,430	705	1.00	705
1914 ...	5,416	8,790	616	1.01	610
1915 ...	5,945	9,102	653	1.03	634
1916 ...	8,517	9,757	873	1.10	794
1917 ...	10,621	10,395	1,022	1.29	792
1918 ...	12,515	10,905	1,148	1.58	726

[a] See Table 5E.
[b] See Table 5F.
[c] See Table 2C.

§ 5f. The Share of the Entrepreneurs and Other Property Owners

The first item dealt with in the share of the propertied classes is the relatively unimportant one of rents and royalties paid to private parties for leased property. The assumption that the net amounts were two-thirds [1] of the totals reported by the Census as being paid for the rent of factories gives an estimate for 1909 of $71,050,000, and for 1914 of $93,800,000. It seems reasonable that rents and royalties should vary in proportion to the number of employees and the general rent level. No figures for business rents are available; hence, it has been necessary to fall back on the index of residence rents compiled by the United States Bureau of Labor Statistics. Since it was a period of nearly stationary prices, it is assumed that rents remained unchanged from 1909 to 1913.

Table 5H shows the rough estimates of rent paid arrived at by the application of these decidedly tenuous assumptions.

It is much more difficult to estimate correctly the share of the net value product going to the entrepreneurs and investors than it is to find the amount going to labor. Table 5C indicates that if we include business savings as part of the income of the entrepreneurs that they and the bond-

[1] Assumed that one-third of the gross rent goes to pay for taxes, repairs, and maintenance.

TABLE 5H

A ROUGH ESTIMATE OF THE PAYMENTS MADE TO PRIVATE INDIVIDUALS IN THE FORM OF RENTS AND ROYALTIES BY THE MANUFACTURING INDUSTRIES COVERED BY THE MAIN REPORT OF THE CENSUS OF 1914

(For the Continental United States)

A	B	C	D	E	F	G
Year	Rent paid to individuals for the use of factories (Thousands)	Thousands of employees attached to industry [c]	Index of residence rents	Composite index C × D	Ratio of B to E	Estimated total rents and royalties paid (Millions) $\frac{E \times F}{1{,}000}$
1909	$71,050 [a]	7,730	1.00 [d]	7,730	9.18 [f]	$ 71
1910		7,810	1.00 [d]	7,810	9.48 [g]	74
1911		7,970	1.00 [d]	7,970	9.79 [g]	78
1912		8,190	1.00 [d]	8,190	9.89 [g]	81
1913		8,430	1.00 [e]	8,430	10.44 [g]	88
1914	93,800 [b]	8,790	1.00 [e]	8,790	10.69 [f]	94
1915		9,102	1.01 [e]	9,193	10.66 [g]	98
1916		9,757	1.02 [e]	9,952	11.05 [g]	110
1917		10,395	1.01 [e]	10,499	11.33 [g]	119
1918		10,905	1.05 [e]	11,450	11.96 [g]	137

[a] *U. S. Census of Manufactures* for 1910, Vol. VIII, p. 129; estimated that two-thirds of rent was paid to individuals.

[b] *Abstract of Census of Manufactures* of U. S. in 1914, p. 517; estimated that two-thirds of rent was paid to individuals.

[c] See Table 5F.

[d] No data; therefore assumed.

[e] U. S. Bureau of Labor Statistics, *Monthly Labor Review*, various numbers in 1920–1921.

[f] Computed by division.

[g] Interpolated along a straight line.

holders together received $1,626,600,000 in 1909 and $1,454,000,000, in 1914. In 1918, the first year in which the Income Tax Bureau presents for manufacturing corporations figures answering our needs, these corporations showed, after paying taxes, net earnings of $2,422,074,926. If we estimate the interest on the funded debt as being 80 per cent of all interest paid, it constitutes an addition of about $430,500,000, making a total of approximately $2,852,575,000.[1] By means of a smooth curve based upon the fractions for 1904, 1909, and 1914, it is estimated that, in 1918, corporations produced 84.7 per cent of all value added by the factories in this field. If we divide by 0.847, we arrive at a figure of about $3,366,000,000, as representing the share going in 1918 to both private and corporate entre-

[1] U. S. Bureau of Internal Revenue *Statistics of Income*, 1918, p. 16.

preneurs and to holders of the funded debt. The gross output of the factories, in this year, has been estimated at $61,040,000,000.[1] If this figure is correct, the ratio of the share of the classes mentioned to the gross value of output is about 0.0551.

TABLE 5I

RETURNS TO ENTREPRENEURS AND HOLDERS OF THE FUNDED DEBT IN THAT PART OF THE MANUFACTURING FIELD COVERED BY THE MAIN REPORT OF THE CENSUS OF 1914 INTERPOLATED UPON THE BASIS OF THE AVERAGE NET EARNINGS OF SIXTY-SIX TYPICAL MANUFACTURING CORPORATIONS

(In the Continental United States)

A	B	C	D	E
Year	Returns to entrepreneurs and holders of the funded debt (Millions)	Index representing net earnings plus bond interest of 66 typical corporations [b]	Ratio of B to C (Millions)	First approximation to the share of entrepreneurs and private creditors in the value product (Millions) C × D
1909	$1,626 [a]	100.0	16.26 [c]	$1,626
1910		118.7	15.40 [d]	1,828
1911		90.7	14.70 [d]	1,333
1912		117.4	14.16 [d]	1,663
1913		132.5	13.80 [d]	1,829
1914	1,454 [a]	106.4	13.67 [c]	1,454
1915		131.2	13.79 [d]	1,810
1916		253.9	14.00 [d]	3,555
1917		304.9	14.43 [d]	4,399
1918	3,366 [e]	228.6	14.72 [c]	3,366

[a] See Table 5C.

[b] Computed from data in Poor's and Moody's *Manuals of Statistics*. Corporations were classified according to size and both totals and a set of indices were obtained for each group. The index series here given is composed of the respective medians for the specified years of the indices for the various groups.

[c] Computed by division.

[d] Interpolated along a smooth curve.

[e] For origin of this figure, see text.

The difference between the items in the second and third columns of Table 5J casts suspicion upon the accuracy of the Census figures. Why should a group of typical corporations show from 11 to 13 per cent of their gross output going to profits when the Census data for the same years indicate only 6 to 8 per cent for the same? Most of the discrepancy presumably arises from the fact that the gross output as reported by the Census contains much more duplication than does that reported by corporations. The Census is taken factory by factory, each plant stating the value

[1] See Table 5B.

TABLE 5J

RETURNS TO ENTREPRENEURS AND HOLDERS OF THE FUNDED DEBT IN THAT PART OF THE MANUFACTURING FIELD COVERED BY THE TOTALS FOR THE CENSUS OF 1914 INTERPOLATED UPON THE BASIS OF THE AVERAGE RATIO OF EARNINGS[a] TO GROSS OUTPUT IN THE CASE OF 31 TYPICAL CORPORATIONS

A	B	C	D	E	F	G
Year	Ratio of share of entrepreneurs and bondholders to gross value of output: According to U. S. Government figures	Ratio of share of entrepreneurs and bondholders to gross value of output: As shown by corporate reports[c]	Ratio of B to C	Estimated ratio of share of entrepreneurs and bondholders to gross output C × D	Estimated gross output[f] (Millions)	Second approximation to the share of entrepreneurs and holders of funded debt (Millions) E × F
1909	0787[b]	133	592[d]	0787	$20,672	$1,626
1910		145	589[d]	0854	21,770	1,859
1911		121	585[d]	0708	21,300	1,507
1912		135	567[d]	0765	24,050	1,839
1913		143	557[d]	0797	25,810	2,056
1914	0600[b]	109	550[d]	0600	24,246	1,454
1915		124	527[d]	0654	28,430	1,860
1916		182	503[d]	0916	43,580	3,994
1917		162	480[d]	0778	57,080	4,444
1918	0534[g]	117	456[d]	0534	63,000	3,366

[a] Earnings equal total of bond interest, dividends, and amount carried to surplus.
[b] See Table 5C for figures from which ratios are derived.
[c] The ratio was computed from reports in Poor's and Moody's *Manuals* for each corporation for each year. The median of the ratios for each year was ascertained and is here recorded.
[d] Computed by division.
[e] Interpolated along a smooth curve.
[f] See Table 5B.
[g] For derivation, see text.

of its output. The large corporations of today, are highly integrated. Thus, a steel company, in reporting its gross sales, does not duplicate the value of the gross outputs of the iron mines, blast furnaces, etc., operated as separate units. But, though the values of outputs of subsidiary plants are not combined to give a grand total of output, the net earnings of all the parts of a corporation may be totaled to arrive at the reported net earnings. The following example may serve to illustrate the situation. Holding Company A operates a series of four factories. Plant 2 uses the output of Plant 1; Plant 3 takes the output of Plant 2; and Plant 4 is the only one selling any final product to outsiders.

From the following table, a computation by the Census method would show the ratio of profit to gross value of output to be $\frac{6}{57}$ or .105.

Plant	Operating expenses	Gross value of output	Profits
1	9	10	1
2	11	12	1
3	14	16	2
4	17	19	2
Total	51	57	6

In the report of Corporation A, however, the gross sales would be reported as only the amount sold to outsiders from the finishing plant, No. 4, or 19; while the net profit would still be reckoned as 6. This would give a ratio of $\frac{6}{19}$ or .316, approximately three times that indicated by the Census method.

There is no way of knowing whether the discrepancy between the ratios derived from the Census and from corporation reports does or does not arise wholly from this difference in accounting, but it is not improbable that this is the chief cause for the dissimilarity of the ratios.

In Tables 5I and 5J, there are derived two distinct estimates of the share in the income from manufacturing going to the entrepreneurs and holders of the funded debt. An average of these two estimates, equal weight being given to each, appears in Column B of Table 5K. This table also shows the distribution of the share of the entrepreneurs and holders of the funded debt, divided into three parts, these parts being estimated from the annual reports of forty-six typical corporations.

The evidence in Table 5K indicates that, as might be expected, the funded debt has consumed a relatively fixed quantity of the net earnings while distributed profits and savings have varied greatly. A better picture of the significant facts is shown in Table 5L in which the nominal amounts have been converted into purchasing power at the prices of 1913. The reasons for choosing the particular price indices used for converting purposes are as follows: stockholders in factories probably possess about the same average income as stockholders in general, and the income tax reports indicate that, in 1919, about as much in dividends went to persons with income above $40,000 per annum as to all below that figure; therefore the $25,000 average expenditure seems a reasonable criterion. Surpluses of manufacturing concerns normally are put into new plant; hence an index of construction costs appears to be the logical correcting factor to apply to business savings in this field.

TABLE 5K

THE ESTIMATED AMOUNTS OF THE EARNINGS GOING TO INTEREST ON FUNDED DEBT, SAVINGS, AND PROFITS WITHDRAWN FROM THE BUSINESS IN THE ENTIRE FIELD OF MANUFACTURING COVERED IN THE PRINCIPAL TABLES OF THE 1914 CENSUS

A	B	C	D	E	F	G	H	I	J
				Distribution of earnings of 46 typical manufacturing corporations[b] (Millions)			Estimated distribution of earnings for entire manufacturing field (Millions)		
Calendar year	Final estimate of the share of entrepreneurs and holders of the funded debt[a] (Millions)	Net earnings plus bond interest of 46 typical mfg. corporations[b] (Millions)	Ratio of B to C	Interest on funded debt	Corporate savings	Dividends	Interest on funded debt D × E	Savings by business units D × F	Distributed to proprietors or stockholders D × G
1909	$1,626	$326	4.988	$66.16	$102.64	$157.18	$330	$ 512	$ 784
1910	1,843	365	5.050	68.71	118.62	177.83	347	599	898
1911	1,420	310	4.581	70.51	60.24	179.23	323	276	821
1912	1,751	361	4.850	71.96	108.24	181.23	349	525	879
1913	1,942	410	4.736	79.60	121.41	209.25	377	575	991
1914	1,454	310	4.690	81.66	29.21	199.14	383	137	934
1915	1,835	453	4.051	80.97	182.43	190.32	328	739	771
1916	3,774	944	3.997	79.95	580.43	284.73	319	2,320	1,138
1917	4,421	980	4.511	82.24	469.07	383.51	371	2,116	1,730
1918	3,366	754	4.464	92.07	319.00	342.96	411	1,424	1,531

[a] Average of estimates in Column E, Table 5I and Column G, Table 5J.

[b] Data collected from Poor's and Moody's *Manuals of Corporation Statistics*. In order to prevent the U. S. Steel Corporation from dominating the sample, the earnings of the other corporations have been multiplied by three before adding its earnings.

TABLE 5L

THE PURCHASING POWER OF THE BUSINESS SAVINGS AND RETURNS TO INVESTORS IN THAT PART OF THE MANUFACTURING FIELD COVERED BY THE PRINCIPAL TABLES OF THE 1914 CENSUS

A	B	C	D	E	F	G	H	I	J
	Estimated disbursements to entrepreneurs and other property owners						Business savings		
	Millions of Dollars								
Calendar year	Rents and royalties[a]	Interest on funded debt[b]	Distributed profits[c]	Total B+C+D	Index of prices of goods consumed by wealthy[d]	Purchasing power at prices of 1913 (Millions) E ÷ F	Millions of dollars[e]	Index of construction costs[f]	Purchasing power at prices of 1913 H ÷ I
1909	$ 71	$330	$ 784	$1,185	.973	$1,218	$ 512	.927	$ 552
1910	74	347	808	1,310	.988	1,335	500	.953	629
1911	78	323	821	1,222	.995	1,228	276	.945	202
1912	81	340	879	1,300	1.000	1,300	525	.983	534
1913	88	377	991	1,455	1.000	1,455	575	1.000	575
1914	94	383	934	1,410	1.010	1,396	137	.960	143
1915	98	328	771	1,197	.993	1,202	730	.992	745
1916	110	319	1,138	1,567	1.074	1,459	2,320	1.194	1,943
1917	119	371	1,730	2,220	1.198	1,853	2,116	1.473	1,435
1918	137	411	1,531	2,078	1.364	1,523	1,424	1.499	950

[a] See Table 5H
[b] See Table 5K, Column H
[c] See Table 5K, Column J
[d] Derivation described in Sec. 20; applies to families spending in 1910 $25,000 annually for consumption goods.
[e] See Table 5K, Column I
[f] Composite index based on U. S. Bureau of Labor Statistics data; building labor wages per hour weighted 3, metals and metal products weighted 2, and lumber and building materials weighted 1.

Table 5L indicates that the purchasing power of the actual disbursements to the propertied classes has shown a somewhat upward tendency throughout the decade and that the savings made by the business enterprises in this field increased to very unusual proportions during the years 1916 to 1917 and remained moderately high even in 1918.

§ 5g. The Fraction of the Net Value Product Paid Out as Wages or Salaries

Table 5M measures the fraction of the net value product of the industry going to the employees.

TABLE 5M

THE ESTIMATED NET VALUE PRODUCT AND THE SHARE THEREOF GOING TO THE EMPLOYEES

For that Part of the Manufacturing Industry Included in the Principal Tables of the 1914 Census

A	B	C	D	E	F
Calendar year	Amounts distributed to entrepreneurs and other property owners [a] (Millions)	Business savings [a] (Millions)	Compensation paid to employees [b] (Millions)	Total net value product (Millions) B + C + D	Per cent of net value product going to the employees D ÷ E
1909.....	$1,185	$ 512	$ 4,410	$ 6,107	72.2
1910.....	1,319	599	4,838	6,756	71.6
1911.....	1,222	276	4,852	6,350	76.4
1912.....	1,309	525	5,361	7,195	74.5
1913.....	1,455	575	5,946	7,976	74.5
1914.....	1,410	137	5,416	6,964	77.8
1915.....	1,197	739	5,945	7,881	75.4
1916.....	1,567	2,320	8,517	12,403	68.7
1917.....	2,220	2,116	10,621	14,957	71.0
1918.....	2,078	1,424	12,515	16,018	78.1

[a] See Table 5L, Column E.
[b] See Table 5E, Column E.

The last column of Table 5M makes it clear that the employees have been receiving from two-thirds to three-fourths of the net value product of manufacturing. While their relative share was low in 1916 and 1917, it reached a higher limit in 1918 than at any previous time in the decade.

Questions concerning changes in the efficiency of the employees cannot be answered without further research.

CHAPTER 6

SUMMARY OF THE HAND TRADES

§ 6a. Introduction

Prior to and including the census of 1900, the reports of the Census Bureau covered the activities of "the hand trades." Since that date, the study of industries of this type has been omitted because of the large expense per establishment involved in the collection of data. As a result, it has been necessary to base most of the estimates for this study upon the 1900 Census figures. Exceptions to this rule are the power laundries, and custom grist and saw mills (trades for which later census reports have given information), and the construction industry and automobile repair industry, the estimates for which have been made largely from other sources than the Census.

The problem of estimating the net value products of the hand trades has been disproportionately laborious, but because of the paucity of reliable information available, has, nevertheless, not produced results of any high degree of reliability. On the contrary, the totals presented in the accompanying tables must be regarded merely as very rough approximations to the actual quantities which they are supposed to represent. Laundries, perhaps, form an exception to this general rule, the information concerning them being so much more complete that the figures presented here may be regarded as moderately reliable.

Since it is felt that the estimates for the individual trades are so inaccurate, and since the interest in the facts concerning most of them is presumably not very widespread, it seems that the expense of publishing a description of the special procedure used for each trade or group of trades is scarcely warranted; hence a summary only is given except in the case of the construction industry. Suffice it to say that the estimates for the separate fields have, in every instance, been made with as great a degree of care as the nature of the data available seems to justify.

The figures for the construction industry are published in detail in Chapter VII, not because the estimates for that field are of a quality superior to the others, but because construction is the largest of the hand trades and is at present a subject attracting wide attention.

TABLE 6A

A ROUGH ESTIMATE OF THE TOTAL OF WAGES AND SALARIES RECEIVED BY EMPLOYEES IN THE HAND TRADES OF THE CONTINENTAL UNITED STATES

Year	Millions of Dollars										
	All hand trades	Construction	Custom tailoring, millinery, dyeing and cleaning	Repair of automobiles	Blacksmithing, bicycle repairing, cabinet making and taxidermy	Laundries	Shoe repairing	Custom dressmaking	Repair of sewing machines, typewriters, locks, clocks and jewelry	Custom grist mills	Custom saw mills
1909	$1,487	$1,192	$ 87	$ 34	$51	$ 63	$13	$33	$10	$1	$2
1910	1,472	1,146	93	48	54	71	13	34	11	1	2
1911	1,443	1,104	93	55	54	74	14	35	11	1	1
1912	1,580	1,218	96	67	55	80	15	35	11	1	1
1913	1,667	1,276	102	75	57	91	16	36	11	1	1
1914	1,336	932	103	90	58	86	15	38	11	1	1
1915	1,352	927	108	102	58	90	15	37	12	2	1
1916	1,545	1,066	141	106	60	96	20	38	14	1	2
1917	1,575	973	204	153	61	98	23	41	18	3	2
1918	1,744	964	276	220	86	106	27	41	20	2	2
1919			306		91		34	47	25		

TABLE 6B

A ROUGH ESTIMATE OF THE TOTAL SHARE OF THE EMPLOYEES IN THE NET VALUE PRODUCT OF THE HAND TRADES OF THE CONTINENTAL UNITED STATES

(Wages and Salaries, Plus Payments for Contract Work)

Year	Millions of Dollars										
	All hand trades	Construction	Custom tailoring, millinery, dyeing and cleaning	Repair of automobiles	Blacksmithing, bicycle repairing, cabinet making, and taxidermy	Laundries	Shoe repairing	Custom dressmaking	Repair of sewing machines, typewriters, locks, clocks and jewelry	Custom grist mills	Custom saw mills
1909	$1,408	$1,192	$ 97	$ 34	$52	$ 63	$13	$33	$11	$1	$2
1910	1,485	1,146	104	48	55	72	14	34	11	1	2
1911	1,455	1,104	103	55	55	74	14	35	11	1	1
1912	1,593	1,218	107	67	56	80	15	36	11	1	1
1913	1,681	1,276	114	75	58	91	16	36	11	1	1
1914	1,350	932	115	90	59	86	15	39	11	1	1
1915	1,366	927	120	102	59	91	15	38	12	2	1
1916	1,563	1,066	157	106	61	97	20	38	14	1	2
1917	1,601	973	227	153	62	99	24	41	18	3	2
1918	1,778	964	307	220	88	106	28	41	20	2	2
1919			340		92		34	47	26		

TABLE 6C

A ROUGH ESTIMATE OF THE NET VALUE PRODUCT OF THE HAND TRADES IN THE CONTINENTAL UNITED STATES

Year	Millions of Dollars										
	All hand trades	Construction	Custom tailoring, millinery, dyeing, and cleaning	Repair of automobiles	Blacksmithing, bicycle repairing, cabinet making, and taxidermy	Laundries	Shoe repairing	Custom dressmaking	Repair of sewing machines, typewriters, locks, clocks, and jewelry	Custom grist mills	Custom saw mills
1909	$2,615	$1,959	$209	$ 59	$124	$98	$ 53	$68	$33	$ 8	$4
1910	2,521	1,806	223	75	131	116	55	69	33	9	4
1911	2,484	1,734	222	91	133	128	57	72	34	10	3
1912	2,685	1,885	230	111	135	144	61	72	34	8	4
1913	2,521	1,669	244	122	139	162	64	74	34	8	4
1914	2,292	1,413	247	149	142	157	60	78	34	8	3
1915	2,326	1,413	258	171	142	154	61	77	36	11	3
1916	2,702	1,647	337	184	146	171	82	78	43	10	4
1917	2,601	1,267	488	266	148	175	94	84	56	19	4
1918	2,984	1,280	661	367	210	191	111	83	61	15	5
1919			732		222		137	97	77		

§ 6b. Analysis

Table 6D contains an analysis of the combined results presented in the immediately preceding tables. It shows that there has probably been relatively little change in the size of the fraction of the total product of this group of industries received by the employees, the share remaining in the neighborhood of three-fifths of the whole. It also appears that while the average nominal wage has risen sharply throughout the decade, there has been but little increase in the earnings when measured in terms of money of constant purchasing power.

TABLE 6D

AN ESTIMATE OF THE SHARE OF THE EMPLOYEES IN THE NET VALUE PRODUCT OF ALL HAND TRADES COMBINED

A	B	C	D	E	F	G	H
Year	Net value product [a] (Millions)	Share of employees [b] (Millions)	Per cent of net value product going to employees $\frac{100C}{B}$	Total number of employees normally attached to hand trades (Thousands)	Average annual earnings per employee $\frac{C}{E}$	Index of prices of goods consumed by manual and clerical workers [c]	Purchasing power of the average annual earnings per employee $\frac{F}{G}$
1909	$2,615	$1,498	57.3	2,144	$ 699	.955	$732
1910	2,521	1,485	58.9	2,182	681	.978	696
1911	2,484	1,455	58.6	2,215	657	.984	667
1912	2,685	1,593	59.3	2,230	714	.994	719
1913	2,521	1,681	66.7	2,248	748	1.000	748
1914	2,292	1,350	58.9	2,108	640	1.01	634
1915	2,326	1,366	58.7	1,972	693	1.03	673
1916	2,702	1,563	57.8	1,861	840	1.10	763
1917	2,601	1,601	61.6	1,695	945	1.29	732
1918	2,984	1,778	59.6	1,489	1,194	1.58	756

[a] See Table 6C.
[b] See Table 6B.
[c] See Table 2C.

CHAPTER 7

THE CONSTRUCTION INDUSTRY [1]

(SHIPBUILDING EXCLUDED)

§ 7a. Introduction

This is one of the so-called hand trades of which the Census Bureau has taken no cognizance since 1900. Even in that year, according to statements in the Census volume, reports were not secured from a large proportion of the smaller concerns; hence the Census totals for 1900 cannot be taken to represent the size of the industry at that date. Without any definite Census base to build upon, it is impossible to follow the usual method of extending the data therefrom by means of other available criteria. The actual amount of construction done in each year must, then, be estimated from sources other than the Census.

§ 7b. Sources of Data

Search has thus far revealed only two extensive collections of data concerning the volume of building. A record of building permits issued in the principal cities is kept by certain financial newspapers. These data throw no light upon construction in the rural districts and do not include contracts let by the Federal Government. The F. W. Dodge Company, publishers of *The American Contractor*, compiles figures supposed to represent for certain well-defined sections of the country the total volume of contracts let each year. It appears probable, however, that some of the smaller contracts fail to appear in their records and that the records were much more incomplete in former years than at present.

Both of these sources of data are, therefore, more or less unsatisfactory, but, since nothing better is at hand,[2] they must form the basis for estimating the amount of construction undertaken in each year. The way in which these sources have been used is described in the following pages.

§ 7c. The Volume of Construction

From the reports of building permits quoted in *The Statistical Abstracts*

[1] Includes construction of buildings, highways, bridges, new railways, docks, etc.

[2] The bulletin entitled *Statistics of Income* published by the Bureau of Internal Revenue gives data concerning gross construction by corporations, but such a large proportion of building is done by individuals that it seems impracticable to obtain from these figures totals representing the entire industry.

of the United States for various years, an estimate has been made of the building permits issued by the list of cities cited in the 1916 number. The population of these cities in 1910 and 1920 can be ascertained from the Census reports and the fraction of the population of the entire United States residing in these cities in the various years has been closely approximated by aid of a smooth curve. The tentative assumption has been made that the amount of building per capita in these cities is typical of the country as a whole, and an estimate for the entire nation has been made upon this basis.

However, these building-permit records do not include the construction contracts awarded by the Federal Government, hence it is necessary to add estimates for this source. A careful study has been made of the records of the Federal Departments and certain information for recent years has also been secured through the courtesy of Mr. Homer Hoyt, formerly with the Building Materials Division of the War Industries Board. The estimates derived from these sources are shown in Table 7A and are there converted to indices based upon the value for 1918.

The method just described gives an estimated gross construction value in 1918 of $2,979,000,000. The F. W. Dodge Company reports contracts in 1918 aggregating $1,655,099,000, for that part of the United States, east of the Missouri and north of the Ohio. The wealth of the whole nation is estimated from the Census of Wealth, Debt, and Taxation to have been in 1918 about 1.685 times as great as that of the reporting territory. If construction is in proportion to wealth, then the total contracts let in the United States should have been about $2,786,000,000, in 1918.

It seems probable that the rural population does not build quite as much in proportion as do the inhabitants of great cities, and because of the difficulties involved it also appears unlikely that the F. W. Dodge Company gets a record of every building contract made. Furthermore, many buildings are constructed without any contract. Under the circumstances, therefore, it seems well to average the estimate for 1918 made on the basis of building permits with that of the F. W. Dodge Company. The resulting average is $2,766,000,000. This figure has been multiplied by the construction index previously described in order to approximate the amount of construction in the United States for each year. The results appear in Table 7A.

TABLE 7A

THE VALUE OF CONSTRUCTION WORK IN THE CONTINENTAL UNITED STATES AS ESTIMATED FROM THE F. W. DODGE COMPANY'S REPORTS ON CONTRACTS LET AND THE BUILDING PERMITS ISSUED IN LEADING CITIES

Year	Building permits issued in a selected list[a] of large cities (Millions)	Ratio of population of given cities to that of U. S.[b]	Private building in U. S.; estimated from permits[c] (Millions)	Federal government construction in U. S.[d] (Millions)	Construction work by railways[g] (Millions)	Sum of preceding three columns (Millions)	F. W. Dodge Co.'s estimate of total construction (Millions)	Estimated value of construction work in U. S.[f] (Millions)
1909..	$772	.2181	$3,540	$ 123	$16	$3,679		$3,708
1910..	726	.2193	3,311	122	38	3,471		3,498
1911..	701	.2210	3,172	143	41	3,356		3,383
1912..	754	.2231	3,380	139	29	3,548		3,576
1913..	686	.2242	3,060	153	44	3,257		3,283
1914..	631	.2257	2,796	154	26	2,976		3,000
1915..	654	.2279	2,870	131	20	3,021		3,045
1916..	840	.2298	3,656	90	53	3,799		3,829
1917..	603	.2315	2,605	419	63	3,087		3,111
1918..	363	.2333	1,556	1,161	28	2,745	$2,786	2,766[e]

[a] For list, see the *Statistical Abstract* of the U. S. for 1916; figures partly estimated.
[b] Calculated by aid of smooth curves.
[c] Calculated by dividing items in the second column by those in the third.
[d] Compiled from records of various Departments; shipbuilding and railway work excluded.
[e] Average of figures in two preceding columns.
[f] The ratio of 2,766 to 2,745 is 1.008. The items in the second column preceding have been multiplied by 1.008 to obtain the items in this column.
[g] Equals two-thirds of amounts appropriated by railways for "Additions to Physical Property." See *Statistics of Railways* by Interstate Commerce Commission.

§ 7d. The Aggregate of Wages and Salaries

Although the information concerning the volume of construction is scanty and unreliable enough, that pertaining to the division of the gross receipts between employees, entrepreneurs and other property owners in this field, and other industries contributing materials or supplies to this industry, is still less adequate.

Contractors in this field do not care to make public either their profits or an itemized list of their expenses. Only one concern has been discovered which publishes annual reports, and even these reports do not extend over the period desired. This concern, the United States Realty Co., is fortunately a large operator and carries on building enterprises of different types in various parts of the United States. It is possible, therefore, that its financial history may be rather typical of that of construction companies

in general. However, this is an assumption resting upon decidedly slender foundations.

The Department of Internal Affairs of Pennsylvania shows in its annual report the relationship between the amount paid for wages and salaries and the gross value of construction for each year. Although fluctuations from year to year doubtless are not uniform in the various sections of the country, it seems probable that the trend of the Pennsylvania ratios does not differ widely from that of the country as a whole. In the absence of more complete data, it has been necessary to rely solely upon these figures in calculating the amount of the payments for wages and salaries.

Under these circumstances, it is clear that estimates of the various shares in the net value product of the building industry are necessarily very crude. The method of deriving such estimates as are possible from the fragmentary information available is described in the following pages.

Table 7B furnishes an estimate of the amount paid by the industry to employees in the form of wages and salaries. It is based wholly upon the assumption that the Pennsylvania ratio of this amount to the gross value of construction is the same as the average ratio for the entire United States.

TABLE 7B

AN ESTIMATE OF THE TOTAL AMOUNT RECEIVED IN THE FORM OF WAGES AND SALARIES BY EMPLOYEES ENGAGED IN THE CONSTRUCTION INDUSTRY

Calendar year	Gross value of construction in the Continental United States[a] (Millions)	Fraction of gross value going to employees	Total payments for wages and salaries[e] (Millions)
1909	$3,708	.3215[d]	$1,192
1910	3,498	.3276[d]	1,146
1911	3,383	.3263[d]	1,104
1912	3,576	.3406[d]	1,218
1913	3,283	.3888[b]	1,276
1914	3,000	.3107[b]	932
1915	3,045	.3043[b]	927
1916	3,829	.2785[c]	1,066
1917	3,111	.3127[b]	973
1918	2,766	.3484[b]	964

[a] See Table 7A.

[b] Assumed to be same as in Pennsylvania; see Reports of Pa. Commissioner of Labor and Industry and Report on Productive Industries for 1919 by the Pa. Dept. of Internal Affairs.

[c] Based on ratio of wages in 1916 to those in 1915 in State of Pennsylvania.

[d] Interpolated between fraction of gross output going to employees in the U. S. according to the Census of 1900 (.2685) and the Pa. figures for 1913. Changes in the hourly wage rate for building labor were used as aids in the interpolation. For wage rates, see Table 7C.

[e] Product of two preceding columns.

§ 7e. The Share of the Entrepreneurs and Other Property Owners: First Estimate

The next step necessary was the computation of the share going to entrepreneurs and other property owners. The starting point was the partial census of the building industry in 1900. In Volume 7, Part 1, page ccxlvi, of the Manufactures Census for that year, there is given a summary of the findings. It shows a payment of $190,898,680, for wages and $321,-339,847, for materials. Depreciation was assumed to have been high and has been estimated at 10% annually on the capital invested. This would give a depreciation allowance of $19,372,564. By adding this amount to the reported expenses of production and deducting the sum from the gross value of the products, the amount received by the entrepreneurs for their services and for the use of their invested resources was estimated at $119,767,815.

A foundation having thus been laid, the next essential was to estimate the relative shares of the leading productive agents for the different years. The steps in order were as follows:—

First, a weighted index of wages per hour in the building trades was computed from the data furnished in Bulletins 131 and 259 of the United States Bureau of Labor. The weights used for the different occupations correspond to the number of men engaged in each trade in 1910 as estimated from the data in the Census of Occupations. They are as follows:—

Bricklayers	156
Building Laborers	686
Carpenters	696
Hod Carriers	170
Inside Wiremen	50
Painters	278
Plasterers	50
Plumbers & Gasfitters	105
Steam Fitters	35
Stone Masons	39
Structural Iron Workers	11
Stone Cutters	10

The indices for each trade were reduced to a common base, then multiplied by the weights specified, and an average of the indices obtained. This average index appears in Table 7C.

Average index numbers for the price of building materials were taken from page 179 of Bulletin 149 of the Bureau of Labor Statistics and from

the *Statistical Abstracts* of the United States for 1918 and 1919 on pages 578 and 568 respectively. These indices were converted by division to the common base 1913.

The profits from construction are shown in the annual reports of the United States Realty Company. This company also derives a large income from rentals. General expenses were divided in proportion to the respective receipts from these two sources and the fraction apportioned to construction was subtracted from the profits from that field. Unfortunately, the operations of the United States Realty Company only go back to 1904, hence it was necessary to manufacture a figure to represent 1899. This quantity was assumed to bear the same ratio to the actual profits for 1909 as the average index of the prices of wages and materials in 1899 bears to the corresponding average in 1909. The imaginary quantity thus computed for 1899 was $903,000.

An estimate of net profits having been thus arrived at for each year, the actual amounts were next converted to an index number based upon the year 1913. Table 7C shows the net results of the operations just described.

TABLE 7C

AN ESTIMATE OF THE RELATIVE VARIATIONS IN PAYMENTS GOING TO SOME OF THE LEADING AGENTS OF PRODUCTION IN THE CONSTRUCTION INDUSTRY

(For the Continental United States)

Year	Estimated net profits of the United States Realty Company derived from construction [b]	Indices of comparative change (Base 1913)		
		Profits of U. S. Realty Company	Wages per hour of building workers [c]	Prices of materials [c]
1899	$ 903,000 [a]	.870	.663	.696
1909	1,215,000	1.171	.918	.911
1910	1,102,000	1.062	.949	1.010
1911	931,000	.897	.960	.996
1912	1,113,000	1.072	.973	.976
1913	1,038,000	1.000	1.000	1.000
1914	892,000	.859	1.017	.97
1915	796,000	.767	1.024	.94
1916	392,000	.378	1.065	1.01
1917	947,000	.912	1.147	1.24
1918	1,485,000	1.431	1.288	1.506

[a] Assumed; see text for basis.
[b] Calculated from *Annual Reports*.
[c] From U. S. Bureau of Labor Statistics data; for description, see text.

An effort was next made to use the data just presented to ascertain the fraction of the gross value of the output of the industry going to entre-

preneurs and other property owners. As a first step, the actual values representing each productive agent in 1899 were multiplied by the indices shown in Table 7C. The next step was to reduce the resulting products to percentages of the gross output for each year. In 1899, 85.40 per cent of the gross value of the product went to the three factors, wages, materials and the entrepreneur.[1] For want of better evidence, this percentage was assumed to have remained constant. The calculated percentages for each year were therefore made to total 85.40. The results derived appear in Table 7D.

TABLE 7D

ESTIMATES OF THE PERCENTAGE OF THE GROSS VALUE OF CONSTRUCTION GOING TO EACH OF THREE IMPORTANT AGENTS IN THE VARIOUS YEARS

(For the Continental United States)

Year	Relative amounts [b] in millions of dollars				Percentage of gross value of construction [c]			
	Profits	Wages	Materials	Total	Profits	Wages	Materials	Total
1899.....	104.2	126.6	223.6	454.4	19.58	23.78	42.04	85.40
1909.....	140.3	175.2	292.7	608.2	19.71	24.61	41.08	85.40
1910.....	127.2	181.2	324.5	632.9	17.18	24.41	43.81	85.40
1911.....	107.4	183.3	320.0	610.7	15.03	25.62	44.75	85.40
1912.....	128.4	185.7	313.6	627.7	17.51	25.28	42.61	85.40
1913.....	119.8[a]	190.9[a]	321.3[a]	632.0[a]	16.20	25.76	43.44	85.40
1914.....	102.9	194.1	311.7	608.7	14.44	27.20	43.76	85.40
1915.....	91.9	195.5	302.0	589.4	13.34	28.29	43.77	85.40
1916.....	45.3	203.3	324.5	573.1	6.58	30.31	48.51	85.40
1917.....	109.2	219.0	398.4	726.6	12.83	25.72	46.85	85.40
1918.....	171.4	245.9	483.9	901.2	16.23	23.30	45.87	85.40

[a] Amounts as shown in Census of 1900; here used as bases.
[b] Derived by multiplying the bases by the indices recorded in Table 7C.
[c] The mode of deriving these percentages is illustrated by the following proportion representing profits in 1899:—1.042: 4.544:: 19.58: 85.40.

From data furnished on pages ccxlvi and 50 of Volume 7, Part 1, of the *Census of Manufactures* for 1900, the following estimates have been derived for the construction industry:—

[1] The entrepreneurs' share includes not only net profits but also all gains due to resources of any sort invested in the construction industry.

Item	Thousands
Wages	$190,899
Salaries	8,652
Land rent [a]	966
Building rent [a]	1,098
Interest paid to private parties (assumed to be two-thirds of all interest)	5,064
Profits	119,768
Total Value Product in 1899	$326,447

[a] Assumed to be five per cent of the value of this type of assets devoted to the industry.

From the above estimates, it appears that the total share of entrepreneurs and investors is about 1.054 times that of entrepreneurs alone.

The percentages shown in the sixth column of Table 7D have therefore been multiplied by this factor to obtain estimates of the proportion of the gross value of construction going to the propertied classes.

TABLE 7E

FIRST ESTIMATE OF THE TOTAL SHARE OF ENTREPRENEURS AND OTHER PROPERTY OWNERS; BASED UPON THE CENSUS OF 1900 AND THE PROFITS OF THE UNITED STATES REALTY COMPANY

A	B	C	D	E
Calendar year	Fraction of gross value constituting profits [a]	Fraction of gross value going to entrepreneurs and other property owners 1.054 × B [b]	Gross value of construction [c] (Millions)	Share of entrepreneurs and other property owners C × D
1909	.1971	.2077	$3,708	$770
1910	.1718	.1811	3,498	633
1911	.1503	.1584	3,383	536
1912	.1751	.1846	3,576	660
1913	.1620	.1708	3,283	561
1914	.1444	.1522	3,000	456
1915	.1334	.1406	3,045	428
1916	.0658	.0694	3,829	266
1917	.1283	.1352	3,111	421
1918	.1623	.1711	2,766	473

[a] See Table 7D.
[b] For explanation of ratio, see text.
[c] See Table 7A.

§ 7f. The Share of the Entrepreneurs and Other Property Owners: Second Estimate

Because of the unreliability of the basis for the fractions recorded in Column C of Table 7E, it seems desirable to make another and independent

estimate of the share of the entrepreneurs and other possessors of property. This has been done by first estimating certain expenses incurred by the builders and subtracting the amounts thus arrived at from the gross value of the output. Table 7F illustrates the modus operandi.

TABLE 7F

SECOND ESTIMATE OF THE SHARE OF THE ENTREPRENEURS AND OTHER PROPERTY OWNERS; DERIVED BY SUBTRACTING CERTAIN EXPENSES FROM THE GROSS VALUE OF CONSTRUCTION

(Millions of Dollars)

A	B	C	D	E	F	G
Calendar year	Payments not going to entrepreneurs or property owners				Gross value of construction [d]	Share of entrepreneurs and property owners F — E
	Cost of materials [a]	Wages and salaries paid [b]	Miscellaneous expenses 0.16 (B + C) [c]	Total B + C + D		
1909	$1,346	$1,192	$406	$2,944	$3,708	$764
1910	1,277	1,146	387	2,810	3,498	688
1911	1,187	1,104	367	2,658	3,383	725
1912	1,284	1,218	400	2,902	3,576	674
1913	1,360	1,276	422	3,058	3,283	225
1914	1,219	932	344	2,495	3,000	505
1915	1,229	927	345	2,501	3,045	544
1916	1,462	1,066	404	2,932	3,829	897
1917	1,565	973	406	2,944	3,111	167
1918	1,283	964	359	2,606	2,766	160

[a] Excludes those used in shipbuilding; calculated from data given in the Census reports on manufactures, the Government bulletins on forestry, the reports of the Geological Survey on *The Mineral Resources of the United States*, various numbers of *The Statistical Abstract*, and the *Annual Reports* of the Secretary of the Navy.
[b] See Table 7B.
[c] Ratio in 1899 according to the Census of 1900.
[d] See Table 7A.

It is improbable that the actual fluctuations in the share of the entrepreneurs and property owners were as violent as those shown in Column G of Table 7F. However, since there seems to be no better criterion by which to adjust the estimates, the best course seems to be to leave them as they stand, remembering meanwhile that they are not accurate enough to portray anything more than general tendencies.

§ 7g. Purchasing Power of Share of Entrepreneurs and Other Property Owners

In Table 7G, the two estimates of the share of property and entrepreneurial effort have been averaged and reduced to a basis of constant pur-

chasing power by dividing by a price index representing estimated changes in expenditures of families having annual total expenses of $5,000. The estimate of the fraction of the net value product received by the employees appears in Table 7H.

TABLE 7G

FINAL ESTIMATE OF THE SHARE OF THE ENTREPRENEURS AND PROPERTY OWNERS IN THE NET VALUE PRODUCT OF THE CONSTRUCTION INDUSTRY

Calendar year	Estimate based on profits of the U. S. Realty Co.[a] (Millions)	Estimate obtained by deduction of expenses[b] (Millions)	Average[c] of two preceding estimates[f] (Millions)	Index of prices of goods consumed by families spending $5,000 per annum[d]	Purchasing power of share of entrepreneurs and property owners at prices of 1913[e] (Millions)
1909	$770	$764	$767	.956	$802
1910	633	688	661	.977	677
1911	536	725	631	.984	641
1912	660	674	667	.999	668
1913	561	225	393	1.000	393
1914	456	505	481	1.013	475
1915	428	544	486	1.002	485
1916	266	897	581	1.088	534
1917	421	167	294	1.252	235
1918	473	160	317	1.448	219

[a] See Table 7E.
[b] See Table 7F.
[c] Simple arithmetic average.
[d] See Table 2G.
[e] Money value divided by price index.
[f] In the opinion of Col. M. C. Rorty (a director of this Bureau), these figures are too high.

TABLE 7H

THE ESTIMATED NET VALUE PRODUCT OF THE CONSTRUCTION INDUSTRY AND THE SHARE THEREOF GOING TO THE EMPLOYEES

Calendar year	Share of entrepreneurs and other property owners[a] (Millions)	Share of employees[b] (Millions)	Total net value product (Millions)	Per cent of net value product going to the employees
1909	$767	$1,192	$1,959	60.8
1910	661	1,146	1,806	63.4
1911	631	1,104	1,734	63.6
1912	667	1,218	1,885	64.6
1913	393	1,276	1,669	76.5
1914	481	932	1,413	66.0
1915	486	927	1,413	65.6
1916	581	1,066	1,647	64.7
1917	294	973	1,267	76.8
1918	317	964	1,280	75.2

[a] See Table 7G.
[b] See Table 7B.

The last column of Table 7H indicates that the employees receive from three-fifths to four-fifths of the net value product and that this proportion has been an increasing one during the decade under consideration.

From the standpoint of the average employee, it is a matter of much moment to know whether he is able to buy more or less with his wages than he could have done a decade ago. The data are too unreliable to be depended upon to give more than a broad outline of the changes that have occurred. The estimates appear in Table 7I.

TABLE 71

THE PURCHASING POWER OF THE ESTIMATED COMPENSATION RECEIVED BY THE AVERAGE EMPLOYEE IN THE CONSTRUCTION INDUSTRY

A	B	C	D	E	F	G	H	I
Calendar year	Total salaries and wages paid [a] (Millions)	Average full time annual compensation [b]	Average number of employees actually working (Thousands) B/C	Fraction of number attached to industry actually working [c]	Number attached to industry (Thousands) D/E	Average pay per employee attached to industry B/F	Index of prices of goods purchased by manual and clerical workers	Purchasing power of annual earnings at prices of 1913 G/H
1909	$1,192	$ 786	1,516	.957	1,585	$ .752	.955 [c]	$787
1910	1,146	787	1,456	.910	1,600	716	.978 [c]	732
1911	1,104	807	1,368	.845	1,619	682	.984 [c]	693
1912	1,218	835	1,458	.902	1,617	753	.994 [c]	758
1913	1,276	830	1,537	.956	1,608	793	1.000 [d]	793
1914	932	835	1,116	.782	1,427	653	1.01 [d]	647
1915	927	879	1,054	.816	1,292	717	1.03 [d]	696
1916	1,066	930	1,146	.960	1,194	893	1.10 [d]	812
1917	973	973	1,000	.975	1,026	948	1.29 [d]	735
1918	964	1,328	726	.959	757	1,273	1.58 [d]	806

[a] See Table 7B.
[b] Based on average wages in construction industry in Pa., average pay of carpenters employed by railways, and the union scale of wages as shown by the records of the U. S. Bureau of Labor Statistics.
[c] Method of calculation described in a separate report.
[d] U. S. Bureau of Labor Statistics index.

So far as can be judged by the rather crude estimates just presented, the economic condition of the building workers has grown neither better nor worse during the decade under consideration.

§ 7h. The Total Value of Construction

It is a matter of interest to compare the gross amount of construction taking place in the United States with the growth in the population. A comparison with total population is of less significance than one with the increase in the number of inhabitants; for one of the prime reasons for new construction is the need of transportation, business buildings, housing and other accommodations for the additional members of the population. The fact should be kept in mind that no inconsiderable share of the construction work during 1917 and 1918 went to meet the temporary needs of war and hence added little to the total permanent improvements in the

country. Table 7J compares the gross figures only, as it is impracticable to segregate that part of the work which was transitory in nature.

TABLE 7J

THE RELATION OF CONSTRUCTION TO POPULATION AND POPULATION GROWTH IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H
Calendar year	Gross value of construction [a] (Millions)	Index of construction costs [b]	Gross value of construction at prices of 1913 (Millions) B/C	Population of Continental U. S. in thousands [c]	Value of per capita construction at prices of 1913 D/E	Increase in population since preceding year [d] (Thousands)	Construction per additional person at prices of 1913 D/G
1909....	$3,708	.939	$3,948	90,370	$44	1,783	$2,214
1910....	3,498	.970	3,606	92,229	39	1,730	2,084
1911....	3,383	.966	3,502	93,811	37	1,530	2,289
1912....	3,576	.987	3,623	95,338	38	1,690	2,144
1913....	3,283	1.000	3,283	97,278	37	2,020	1,625
1914....	3,000	.969	3,096	99,194	31	1,560	1,985
1915....	3,045	.980	3,107	100,428	31	1,210	2,568
1916....	3,829	1.126	3,401	101,722	33	1,330	2,557
1917....	3,111	1.371	2,269	103,059	22	1,250	1,815
1918....	2,766	1.481	1,868	104,182	18	650	2,874

[a] See Table 7A.
[b] Derived by averaging indices representing respectively the hourly wages of building labor, the prices of lumber and building materials, and the prices of metals and metal products, using weights 2, 2, and 1 respectively. For data, see Table 7C of this report, and *Bulletin 269* of the U. S. Bureau of Labor Statistics.
[c] Derivation described in Sec. 2a.
[d] See the last column of Table 2A for data from which this is derived.

The indications are quite clear that the volume of construction per capita has declined almost steadily throughout the decade and, were the temporary war construction for 1917 and 1918 omitted from consideration, the building shortage in those years might be found to be considerable. However, the amount of construction work per additional member of the population has not fallen off. It is unfortunate that the paucity of data concerning the construction industry does not permit of more accurate estimates but it is hoped that even these rough approximations may give a general idea of the situation in this important field.

CHAPTER 8

SUMMARY OF TRANSPORTATION

The tables which follow combine the data for the various reported branches of transportation and give totals for the whole field. It is believed that such totals may be of interest to those persons who desire to view the situation from its broader aspects. The totals are all obtained by combining the similar items in the corresponding tables in the separate reports.

TABLE 8A

THE SHARE OF THE ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE NET VALUE PRODUCT OF THE TRANSPORTATION INDUSTRY [a]

A	B	C	D	E	F	G
Year	Net disbursements to entrepreneurs and other property owners [b] (Millions)	Business savings [b] (Millions)	Total share of entrepreneurs and other property owners (Millions) B + C	Purchasing power in millions at prices of 1913 of: Net disbursements to entrepreneurs and other property owners [b]	Business savings [b]	Total share of entrepreneurs and other property owners E + F
1909	$879	$244	$1,124	$904	$265	$1,170
1910	974	257	1,231	987	271	1,258
1911	1,013	167	1,180	1,019	178	1,196
1912	1,054	170	1,224	1,054	173	1,227
1913	1,107	91	1,198	1,107	91	1,198
1914	1,107	24	1,131	1,095	24	1,119
1915	1,097	261	1,359	1,102	262	1,363
1916	1,157	453	1,611	1,077	380	1,456
1917	1,192	363	1,555	991	250	1,241
1918	1,120	157	1,277	817	107	924

[a] Includes Railways, Switching and Terminal Cos., Express Cos., Street and Electric Railways, Electric Light and Power Plants, Telegraphs, Telephones, Transportation by Water, and the Pullman Co.

[b] Aggregate of similar items in separate industrial reports.

A study of Tables 8A, 8B, and 8C makes it clear that while, for the owners of transportation enterprises, 1915 and 1916 were relatively prosperous years, 1917 showed a marked falling off in their gains and 1918 was dis-

TABLE 8B

THE SHARE OF THE EMPLOYEES IN THE NET VALUE PRODUCT OF THE TRANSPORTATION INDUSTRY [a]

A	B	C	D
Year	The total net value product [b] (Millions)	Total share of the employees [b] (Millions)	Per cent of net value product paid to employees as compensation for services $\frac{100\ C}{B}$
1909	$2,765	$1,641	59.3
1910	3,029	1,798	59.4
1911	3,069	1,889	61.5
1912	3,249	2,025	62.3
1913	3,336	2,138	64.1
1914	3,170	2,040	64.4
1915	3,428	2,069	60.4
1916	4,028	2,417	60.0
1917	4,539	2,985	65.8
1918	5,232	3,956	75.6
1919			

[a] For industries included see Table 8A, note (a).
[b] Aggregate of similar items in separate industrial reports.

tinctly the worst year of the decade. Currency inflation, coupled with rate regulation, was presumably largely responsible for this state of affairs.

On the other hand, in 1915 the percentage of the net value product going to the employees fell below normal while the purchasing power of their average annual earnings did likewise. By 1918, however, this percentage had risen far above the average level for the decade and the purchasing power of the average earnings had also increased to a figure distinctly higher than that for any preceding year of the period.

TABLE 8C

THE AVERAGE ANNUAL EARNINGS PER EMPLOYEE ATTACHED TO THE TRANSPORTATION INDUSTRY [c]

A	B	C	D	E	F
Year	Total share of the employees [a] [b] (Millions)	Number of employees normally attached to the transportation field [b] (Thousands)	Average annual earnings per employee B ÷ C	Index of prices of goods bought by manual and clerical workers	Purchasing power of average annual earnings per employee D ÷ E
1909 ...	$1,641	2,499	$ 657	.955	$688
1910 ...	1,798	2,614	688	.978	703
1911 ...	1,889	2,709	697	.984	709
1912 ...	2,025	2,768	731	.994	736
1913 ...	2,138	2,805	762	1.00	762
1914 ...	2,040	2,828	721	1.01	714
1915 ...	2,069	2,846	727	1.03	706
1916 ...	2,417	2,872	842	1.10	765
1917 ...	2,985	2,933	1,017	1.29	789
1918 ...	3,956	3,075	1,286	1.58	814

[a] See Table 8B, Column C.
[b] Aggregate of similar items in separate industrial reports.
[c] For industries included see Table 8A, note (a).

CHAPTER 9

STEAM RAILWAY, SWITCHING AND TERMINAL COMPANIES

§ 9a. Nature of Available Information

The Interstate Commerce Commission, for a number of years, has required the railways of the country to render annual statements of their business. While the accounts for the large roads (designated as Class I), are fairly complete for each year, the form of the summary reports for "all roads considered as one system" has changed materially from time to time, making it somewhat difficult to obtain strictly comparable figures. Many of the minor items have been grouped together in these condensed summaries and, in such instances, it cannot be determined to which categories they should be assigned. The data for the switching and terminal companies are not recorded until recent years. Here and there, items are omitted. Owing to these shortcomings of the data, it is certain that the figures presented herewith contain many inaccuracies.

Fortunately, however, the major items of interest, namely those recording the funded debt, dividends, compensation to employees, additions to physical property, and amounts carried to surplus have been reported each year and presumably the figures are fairly comparable throughout. These items combined apparently constitute at least 95 per cent of the value dealt with. Under these circumstances, one feels safe in saying that, outside of definite errors [1] which may exist in the statistics furnished to the Interstate Commerce Commission, the figures herewith presented are sufficiently accurate to show the main facts desired. A computation, in which an entirely distinct method of approach was used, showed a value product differing by not over two or three per cent from that obtained by the process finally determined upon except in 1909 and 1910, years in which the classification of the data was less complete than at later periods.

§ 9b. Method of Utilizing Data

The theory underlying the selection of the data chosen to represent the value product of the industry is as follows: The amount carried to surplus is the joint property of the stockholders and constitutes part of the saving made from current earnings. Other items which similarly enter into sav-

[1] The place where error is most likely is in the amounts recorded as representing the annual surplus. Errors in depreciation accounts give rise to equally large errors in the annual surplus. It is impossible to say whether the depreciation allowances are too large or too small.

ings are funds set aside to compensate for the original sale of stock below par, and additions made to the sinking fund. These are offset to some extent by bond premiums written off and by receipts from sinking funds accumulated in earlier years. These receipts evidently represent the productivity of the past rather than of the present. The fact that the discounts now written off were, in the past, losses to the corporation, does not alter the fact that the assets now cancelling these discounts are part of the current earnings and represent savings for the stockholders which might be paid out in dividends if the directors thought that policy advisable. Sums set aside from earnings for additions and betterments to the physical property have also been included in the share of the stockholders because they likewise represent savings from current income.

Items classified merely as "Miscellaneous Appropriations from Income" have not been included in the current income for it is assumed that most of this account represents funds set aside to cover losses of one sort or another, due perhaps to depreciation, obsolescence, or bad investments.

Changes in the designations and classification of various appropriations make it impossible to allocate them correctly. A careful endeavor has been made to include or exclude corresponding items in each year and it is believed that this task has been accomplished with a fair degree of success. The amounts in doubt are too small to invalidate any of the main conclusions of this report, even if some of the items have been misplaced.

The income distributed by the railways in the form of interest and dividends is partly derived from inter-corporate payments and partly derived from bond interest and dividends received on the stock of corporations outside the railway field. Payments from one railway to another should evidently be deducted and since, in dealing with other industries, it has been assumed that their dividends and bonds interest have been paid to individuals, it would evidently be a duplication again to include this income here. For this reason, all bond interest and dividends received from stocks owned have been deducted from the similar items paid out by the railways. The remainders represent only payments made possible by the operation of railways and do not include returns from the investments of railways in other industries. Salaries and wages paid are evidently individual gains made possible by railway activity and hence must be included. A trivial item appearing in the later accounts is entitled "Uncollectible Revenues." This quantity, in each case, has been assumed to constitute a part of the net value product of the railway field, for it represents a valuable service received by someone, and this condition is not altered by the fact that the railway company has not been paid therefor.

Since the year 1915, the Interstate Commerce Commission has included in the *Statistics of Railways* a summary of the reports of switching and ter-

TABLE 9A

ESTIMATES[t] OF THE AMOUNTS SAVED FROM CURRENT REVENUES BY THE STEAM RAILWAY, SWITCHING AND TERMINAL COMPANIES OF THE CONTINENTAL UNITED STATES

(Millions of Dollars)

Year	Net reduction of security discounts[a]		Additions and betterments to physical property		Net addition to sinking funds[b]		Balance carried to surplus[x]		Total savings	
	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.
Ending June 30										
1909...	20.3[d]	c	24.9[k]	c	7.2[o]	c	79[k].2[r]	c	131.6	
1910...	26.7[d]	c	57.8[l]	c	9.5[qv]	c	122.0[l]	c	216.0	
1911...	18.7[d]	c	62.3[e]	c	13.9[ep]	c	23.5[e]	c	118.4	
1912...	17.6[e]	c	44.2[e]	c	14.7[ep]	c	0.0[e]	c	76.5	
1913...	32.1[f]	c	66.4[f]	c	30.6[f]	c	32.7[f]	c	161.8	
1914...	15.5[f]	c	40.5[f]	c	11.5[f]	c	—124.1[f]	c	—56.6	
1915...	17.9[g]	0.07	30.7[g]	0.2[m]	10.4[g]	0.3[m]	— 36.7[g]	1.2[m]	21.7	1.8
1916...	25.9[h]	0.22	76.5[h]	0.2[n]	18.0[h]	0.7[n]	191.4[h]	6.0[n]	311.8	7.1
Calendar										
1916...	21.7[i]	0.5[i]	84.4[i]	0.3[i]	14.8[i]	0.8[i]	188.1[i]	3.2[i]	309.0	4.8
1917...	19.8*	0.5[s]	95.1[z]	1.0[s]	10.8[y]	0.6[s]	154.7[w]	—1.6[s]	280.4	0.5
1918[c].	6.8†	0.6[v]	43.1[j]	0.3[v]	9.7[y]	0.6[v]	53.5[u]	2.1[v]	113.1	3.6

R = Interstate Commerce Commission—*Statistics of Railways.*

[a] "Amortization of Discount" plus "Stock and Debt Discount Extinguished" minus "Release of Premium on Funded Debt."

[b] "Appropriation to Sinking and Other Reserve Funds" minus "Income from Sinking and Other Reserve Funds."

[c] Item not given in reports of Interstate Commerce Commission.

[d] Assumed to bear the same ratio as in 1912 (viz. .0642) to the sum of "Surplus" and "Dividends Paid."

[e] R. 1912, pp. 51–52.

[f] R. 1914, p. 52.

[g] R. 1915, p. 49.

[h] R. 1916 (fiscal year), p. 51.

[i] R. 1916 (calendar year), p. 53; figures for switching and terminal companies arrived at by deducting railway data from combined figures.

[j] Item for Class I Operating and Non-Operating roads multiplied by 1.013, the ratio for 1916 of the total to Class I for this item.

[k] R. 1909, p. 72.

[l] R. 1910, p. 69.

[m] R. 1915, p. 58.

[n] R. 1916 (fiscal year), p. 60.

[o] Assumed to vary in same proportion from year 1910 as does the sum of "Surplus" and "Dividends Paid."

[p] Equals "Sinking and redemption funds chargeable to income" plus "Appropriations for other reserves."

[q] R. 1911, p. 53.

[r] Includes "Advances to weak lines to cover deficits."

[s] R. 1917, pp. 36–37.

[t] "Corporate" statistics for roads under Federal control combined with figures for non-controlled roads.

[u] Item for Class I Operating and Non-Operating roads multiplied by 0.97, the ratio in 1916; see Note w.

[v] R. 1918, pp. 46–47.

[w] 97% of 159.3 the increase in "Balance" during the year of Class I Operating and Non-Operating roads. This is the ratio in 1916; Classes II and III both showing decreases in assets.

[x] Net corporate income—total appropriations for year; after 1916, equals the balance at the end of the year less the balance at the beginning of the year.

[y] The ratio of this item for all roads to the same item for Class I Operating and Non-Operating roads was 1.028 in 1916. The item for this year has been multiplied by that ratio to obtain the amount here entered.

[z] The item for this year is that for Class I Operating and Non-Operating roads. No adjustment has been made, for the 1916 records show the appropriations by other classes of roads to have been negligible.

* The ratio in 1916 of this item for all to the same item for Class I Operating and Non-Operating roads was 1.051; hence the item for this year for Class I roads has been multiplied by this ratio.

† Item for Class I Operating and Non-Operating roads multiplied by 1.003, the ratio for 1916 of the total to Class I for this item.

THE ESTIMATED AMOUNTS COMPOSING THE SHARE OF THE SECURITY HOLDERS IN THE ANNUAL VALUE PRODUCT OF THE RAILWAY, SWITCHING, AND TERMINAL COMPANIES OF THE CONTINENTAL UNITED STATES

(Millions of Dollars)

Year	Amounts as recorded in statistics of railways								Estimated ratio of total to total for railways only	Estimated total for railway, switching and terminal companies
	Excess of dividends paid by companies over dividends received by them from investments		Excess of interest on funded debt paid by companies over similar interest received by them from investments		Savings [p]		Total of preceding items			
	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.	Railways	Switching and terminal cos.		
Ending June 30										
1909..	236.6 [a]	*m*	290.5 [an]	*m*	131.6	*m*	658.7		1.021 [r]	672.6 [s]
1910..	293.8 [b]	*m*	291.6 [n]	*m*	216.0	*m*	801.4		1.021 [r]	818.2 [s]
1911..	266.8 [c]	*m*	386.9 [c]	*m*	118.4	*m*	772.1		1.021 [r]	788.3 [s]
1912..	273.3 [c]	*m*	372.7 [c]	*m*	76.5	*m*	722.5		1.021 [r]	737.7 [s]
1913..	230.8 [d]	*m*	395.3 [d]	*m*	161.8	*m*	787.9		1.021 [r]	804.4 [s]
1914..	312.0 [d]	*m*	402.8 [d]	*m*	—56.6	*m*	658.2		1.021 [r]	672.0 [s]
1915..	237.5 [e]	2.7 [j]	422.6 [e]	11.9 [j]	21.7	1.8	681.8	16.4	1.021 [q]	698.2 [t]
1916..	244.7 [f]	1.6 [k]	426.3 [f]	13.5 [k]	311.8	7.1	982.8	22.2	1.021 [q]	1,005.0 [t]
Calendar										
1916..	262.8 [g]	5.8 [g]	426.7 [g]	14.2 [g]	309.0	4.8	998.5	24.8	1.025 [q]	1,023.3 [t]
1917..	257.6 [ih]	5.0 [i]	426.0 [iv]	14.9 [i]	280.4	0.5	964.0	20.4	1.021 [q]	984.4
1918..	246.3 [uv]	2.8 [u]	417.0 [uw]	15.5 [u]	113.1	3.6	776.4	21.9	1.026 [r]	798.3

R. = Interstate Commerce Commission—*Statistics of Railways.*

[a] R. 1909, p. 72.

TABLE 9B NOTES—*continued*

[b] R. 1910, p. 69.
[c] R. 1912, pp. 51–52.
[d] R. 1914, p. 52.
[e] R. 1915, p. 49.
[f] R. 1916 (fiscal year), p. 51.
[g] R. 1916 (Calendar year), p. 53; figures for switching and terminal companies arrived at by deducting railway data from combined figures.
[h] The figures for railways are obtained by multiplying the net dividends for Operating and Non-Operating Class I roads by 1.015, the ratio of the total to the same items in 1916.
[i] R. 1917, Statements 31 and 33.
[j] R. 1915, p. 58.
[k] R. 1916 (fiscal year), p. 60.
[m] Not reported by Interstate Commerce Commission.
[n] From this item, receipts of interest on bonds and dividends have both been deducted.
[o] 101.8% of net interest payments of Class I roads were for funded debt, (since receipts of interest on unfunded debt were greater than payments of the same type). Applying same percentage to all roads for 1917 gives the amount here entered as bond interest.
[p] Derivation of these items shown in Table 9A.
[q] Computed from figures in two immediately preceding columns.
[r] Assumed on basis of figures for 1915 and 1916.
[s] Product of quantities in first and third columns preceding this one.
[t] Computed by addition of original items, these being carried to more decimal places than those in this table.
[u] R. 1918, pp. 43–44, 46–47, 74.
[v] 242.2, the amount for Class I Operating and Non-Operating Companies times 1.015, the ratio of Classes I, II, and III to Class I in 1916.
[w] 401.8, the amount for Class I Operating and Non-Operating Companies times 1.037, the ratio of Classes I, II, and III to Class I in 1916 for interest on funded debt.

minal companies. The total value product of this field is only about two per cent as large as that of the railways—hence. it has been deemed sufficiently exact to make the adjustment for the years preceding 1915 by the simple method of multiplying the railway figures by appropriate factors derived form a study of the ratios in 1915 and 1916.

§ 9c. The Net Value Product and Its Distribution

The estimates derived from the reports of the Interstate Commerce Commission through the application of the theories and methods just described are presented in Tables 9A. 9B. 9C, 9D, and 9E.

Table 9E shows the recorded amounts going to each of the principal classes of recipients during the fiscal years from 1909 to 1916, and also estimates for the calendar years from 1909 to the latest report published by the Interstate Commerce Commission. These estimates have been made simply by averaging the data for the adjoining fiscal years. This process tends to smooth out to a degree the irregularities due to cyclical or chance causes, but it makes the direction of the trend more evident.

Perhaps the most significant column in Table 9E is the last. This shows that the employees have been receiving from three-fifths to three-fourths of the net value product of the industry, the fraction varying materially from year to year but indicating no definite trend until 1917 when a sharp upward movement begins and continues through 1918.

§ 9d. The Physical Output per Employee

Table 9F illustrates the development of important phases of railway activity. The data have been estimated for the calendar years in order to make them comparable with other fields of industry.

TABLE 9C

THE ESTIMATED SHARE OF EMPLOYEES IN THE ANNUAL VALUE PRODUCT OF THE STEAM RAILWAY, SWITCHING, AND TERMINAL COMPANIES OF THE CONTINENTAL UNITED STATES

(Millions of Dollars)

Year	Compensation paid for services					Estimated payments to employees for personal injuries	Relief and pensions for employees	Estimated total share of employees
	Railways	Switching and terminal companies			Estimated total, all companies			
		Amounts reported	Ratio to R. R. compensation	Estimated amount				
Ending June 30								
1909..	$ 988 g		.0244 e	$24	$1,012	$ 9 m	$2 m	$1,021
1910..	1,144 g		.0246 e	28	1,172	11 n	3 n	1,185
1911..	1,208 g		.0248 e	30	1,238	12 p	3 p	1,253
1912..	1,252 g		.0250 e	31	1,284	13 q	3 q	1,300
1913..	1,381 h		.0252 e	35	1,416	14 r	4 r	1,433
1914..	1,381 i		.0254 e	35	1,416	15 s	4 s	1,436
1915..	1,173 j	30.1 a	.0256 d	30	1,203	12 t	5 t	1,220
1916..	1,404 b	36.4 b	.0259 d	36	1,440 l	13 u	5 u	1,458
Calendar								
1916..	1,507 c	39.8 c	.0264 d	40	1,547	14 v	6 v	1,566
1917..	1,917 k		.0264 e	51	1,968	16 x	7 y	1,990
1918..	2,670 z		.0264 e	70	2,740	15	8 k	2,763

R = Interstate Commerce Commission—*Statistics of Railways in the United States.*

a R. 1915, p. 31.
b R. 1916, p. 49.
c R. 1916, pp. 32–34.
d Computed.
e Assumed to vary along a smooth curve.
f Compensation to railway employees multiplied by assumed ratios.
g R. 1912, p. 29.
h R. 1914, p. 29. Data adjusted for absence of Class III roads on basis of proportion of wages paid by those roads in 1914.
i R. 1914, p. 29.
j R. 1915, p. 31; wages adjusted by assuming that the missing Class III wages are of the same relative importance as Class III operating expenses.
k 1918 Report of Railway Wage Commission, p. 102.
l Last figure correct—original data carried to more decimals.
m R. 1909, pp. 75–79.
n R. 1910, pp. 73–76.
o 45% of total paid for all injuries to persons; assumed that employees get this amount, other injured persons 25% and attorneys 30%. The last amount is not the product of the railway industry, according to our classification.
p R. 1911, pp. 58–60.
q R. 1912, pp. 56–58.
r R. 1913, pp. 54–57.
s R. 1914, pp. 59–61.
t R. 1915, pp. 65–70.
u R. 1916, fiscal year, pp. 67–89.
v R. 1916 (Calendar year), pp. 66–76.
w Data for Class I roads only—others do not report; amounts doubtless negligible.
x R. 1917, pp. 40–43; figures for Class I roads adjusted on basis of 1916 ratios to represent all roads.
y R. 1917, p. 43.
z R. 1918, p. 24; figures for Class I roads multiplied by 1.025, the 1916 ratio of wages on all roads to wages on Class I roads only.
k Figures for Class I roads multiplied by 1.020 the ratio in 1916 of all roads to Class I roads only. R. 1918, pp. 55–59.

TABLE 9D

MISCELLANEOUS ITEMS IN THE VALUE PRODUCT OF THE PRIVATELY OPERATED RAILWAY, SWITCHING, AND TERMINAL COMPANIES OF THE CONTINENTAL UNITED STATES

(Millions of Dollars)

Year	Uncollectible revenues reported			Damages paid to non-employees for personal injuries	Estimated total of miscellaneous items
	Switching & terminal companies	Railways	Estimated total, all companies		
Ending June 30					
1909			0.6[q]	5.2[a]	5.8
1910			0.6[q]	5.9[b]	6.5
1911			0.7[q]	6.5[c]	7.2
1912			0.7[q]	7.0[d]	7.7
1913			0.8[q]	7.6[e]	8.4
1914			0.8[q]	8.0[f]	8.8
1915	.006[l]	0.7[b]	0.7	6.8[g]	7.5
1916	.006[m]	0.8[n]	0.8	6.9[h]	7.7
Calendar					
1916	.007[o]	0.8[o]	0.8	7.5[i]	8.3
1917	.005[p]	0.7[p]	0.7	8.7[j]	9.4
1918	.003[s]	0.6[t]	0.6	8.3[k]	8.9

R. = Interstate Commerce Commission—*Statistics of Railways*.

[a] R. 1909, pp. 75–79.
[b] R. 1910, pp. 73–76.
[c] R. 1911, pp. 58–60.
[d] R. 1912, pp. 56–58.
[e] R. 1913, pp. 54–57.
[f] R. 1914, pp. 59–61.
[g] R. 1915, pp. 65–70.
[h] R. 1916 (fiscal year), pp. 67–89.
[i] R. 1916 (calendar year), pp. 66–76.
[j] R. 1917, pp. 40–43, figures for Class I roads adjusted on basis of ratio in 1916.
[k] R. 1918, pp. 55–59, figures for Class I roads multiplied by 1.020, the ratio in 1916 of all roads to Class I roads.
[l] R. 1915, p. 58.
[m] R. 1916 (fiscal year), p. 60.
[n] R. 1916 (fiscal year), p. 51.
[o] R. 1916 (calendar year), p. 53.
[p] R. 1917, pp. 34–36.
[q] Roughly estimated.
[r] Estimated at 25% of all amounts paid for personal injuries.
[s] R. 1918, p. 46.
[t] R. 1918, p. 43.

THE ESTIMATED DIVISION OF THE ANNUAL VALUE PRODUCT OF THE STEAM RAILWAY, SWITCHING, AND TERMINAL COMPANIES OF THE CONTINENTAL UNITED STATES

(Millions of Dollars)

A		B		C		D		E		F		G		H
Year		Share of the security holders						Miscellaneous items [a]		Share of employees [c]		Estimated total net annual value product [d]		Per cent of net value product going to employees [f]
Ending June 30	Calendar	Corporate savings		Net dividends and bond interest		Receipts and savings combined B + C								
1909		134 [b]		538 [b]		673		6		1,024		1,702		
	1909		177 [e]		568 [e]		745 [e]		6 [e]		1,105 [e]		1,856 [e]	59.5
1910		220 [b]		598 [b]		818		7		1,185		2,010		
	1910		171 [e]		633 [e]		803 [e]		7 [e]		1,219 [e]		2,029 [e]	60.1
1911		121 [b]		667 [b]		788		7		1,253		2,049		
	1911		99 [e]		664 [e]		763 [e]		7 [e]		1,277 [e]		2,047 [e]	62.4
1912		78 [b]		660 [b]		738		8		1,300		2,045		
	1912		120 [e]		650 [e]		770 [e]		8 [e]		1,367 [e]		2,146 [e]	63.7
1913		165 [b]		639 [b]		804		8		1,433		2,246		
	1913		53 [e]		685 [e]		738 [e]		9 [e]		1,434 [e]		2,181 [e]	65.8
1914		—58 [b]		730 [b]		672		9		1,436		2,117		
	1914		—17 [e]		702 [e]		685 [e]		8 [e]		1,328 [e]		2,021 [e]	65.7
1915		23 [g]		675 [g]		698		7		1,220		1,925		
	1915		171.5 [e]		680 [e]		852 [e]		8 [e]		1,339 [e]		2,199 [e]	60.9
1916		319 [g]		686 [g]		1,005		8		1,458		2,470		
	1916		314 [g]		709.5 [g]		1,023		8		1,566		2,598	60.3
	1917		281 [g]		703.5 [g]		984		9		1,990		2,984	66.7
	1918		117 [g]		682 [g]		798		9		2,763		3,570	77.4

[a] See Table 9D.
[b] See Table 9B; estimated from data there given.
[c] See Table 9C.
[d] Computed from original data carried to more decimal places than the figures here given; equals D + E + F.
[e] Interpolated between the two fiscal years.
[f] Equals F ÷ G.
[g] Equals sum of amounts recorded in Table 9B.

TABLE 9F

MEASURES OF ACTIVITY OF STEAM RAILWAY, SWITCHING, AND TERMINAL COMPANIES ESTIMATED FOR THE CALENDAR YEARS

(Data for the Adjoining Fiscal Years[a] Averaged)

Year	Wages and salaries paid employees (Millions)		Number of employees[c] actually at work (Thousands)		Revenue freight carried (Billions of ton miles)		Passenger traffic (Billions of passenger miles)	
	Year ending June 30[b]	Calendar year	Year ending June 30	Calendar year	Year ending June 30	Calendar year	Year ending June 30	Calendar year
1909	$1,012	$1,092	1,540[d]	1,641	219[j]	237[l]	29.1[j]	30.7[l]
1910	1,172	1,205	1,742[d]	1,742	255[j]	254[l]	32.3[j]	32.8[l]
1911	1,238	1,261	1,742[e]	1,750	254[j]	259[l]	33.2[j]	33.2[l]
1912	1,284	1,350	1,759[d]	1,817	264[j]	284[l]	33.1[j]	34.1[l]
1913	1,416	1,416	1,876[f]	1,814	301[j]	297[l]	34.6[j]	35.4[l]
1914	1,416	1,310	1,753[d]	1,604	288[j]	283[l]	35.3[j]	34.0[l]
1915	1,203	1,322	1,456[f]	1,575	274[k]	309[l]	31.8[k]	33.2[l]
1916	1,440	1,547[b]	1,695[g]	1,744[h]	340[k]	365[k]	33.6[k]	35.0[k]
1917		1,968[b]		1,834[i]		397[k]		40.0[k]
1918		2,741[b]		1,937[m]		409[k]		43.2[k]

R. = Interstate Commerce Commission—*Statistics of Railways.*

[a] Years ending June 30.

[b] See Table 9C.

[c] In 1915 and 1916, the switching and terminal companies employed about 2.4% as many men as the railways; hence for other years the number of railway employees has been multiplied by 1.024.

[d] *Statistical Abstract of U. S.* for 1919, p. 344.

[e] R. 1911, p. 26.

[f] R. 1913, p. 23 and 1915, p. 26. Adjusted to include Class III roads on the basis of the 1912 ratio.

[g] R. 1916 (fiscal year), pp. 25–26.

[h] R. 1916 (calendar year), pp. 25–26.

[i] R. 1917, p. 19.

[j] *Statistical Abstract of U. S.* for 1919, p. 797.

[k] R. 1918, p. 37.

[l] Average of figures for two overlapping fiscal years.

[m] R. 1918, pp. 20–22.

There has been much discussion concerning the growing efficiency or inefficiency of railway labor during the last decade. Certain facts concerning this issue have been brought out by our investigation and are presented in Table 9G.

This Table shows a very marked growth in the output per employee, especially in the amount of freight transported, the increase being just about fifty per cent from 1909 to 1917. Whether this change was the result of inventive genius, a better supply of equipment, more effective management, or greater diligence on the part of the employees, is a subject still open for investigation. The fact is clear, however, that in, 1917, the aver-

TABLE 9G

THE AVERAGE OUTPUT PER EMPLOYEE ACTUALLY AT WORK FOR STEAM RAILWAY, SWITCHING, AND TERMINAL COMPANIES COMBINED[a]

(Estimates for Calendar Years)

Calendar year	Number of ton miles of freight per employee	Passenger miles per employee	Value product per employee at prices current in given year	Index of prices of railway service[b] Base, 1914	Value product per employee at prices of 1914[d]
1909....	144,400	18,720	$1,131	102.3	$1,106
1910....	146,000	18,810	1,165	102.2	1,140
1911....	147,900	18,950	1,169	102.0	1,144
1912....	156,100	18,750	1,181	100.7	1,173
1913....	163,500	19,500	1,202	100.0	1,202
1914....	176,300	21,180	1,260	100.0	1,260
1915....	196,000	21,050	1,396	99.3	1,406
1916....	209,100	20,090	1,490	98.5c	1,513
1917....	216,600	21,810	1,627	99.7c	1,632
1918....	211,000	22,310	1,843	117.9c	1,563

[a] For sources of data, see Tables 9E and 9F. The figures here given are obtained by division of the other items by those in the fifth column of Table 9F.

[b] The price index here given is proportional to the combined value of 10 freight ton miles and 1 passenger mile. This ratio represents the approximate proportion of each factor in the output of 1917, and is fairly representative for all years. Data for pairs of fiscal years have been averaged to obtain estimates for calendar years. See *Statistical Abstract of U. S.* for 1919, p. 332.

[c] Interstate Commerce Commission, *Statistics of Railways*, 1918, p. 37.

[d] Value product at current prices divided by the index of prices of railway service.

age railway employee moved much more traffic and obtained a materially larger value product for the industry than he did in 1909, and the increase in the value product was real and not merely a reflection of increased prices for the service furnished.

§ 9e. Growths of Railway Service and of Population Compared

Another interesting comparison is that of the relative growths of railway service and of population. There has been great complaint concerning a shortage of railway equipment and service. Is this complaint due to the fact that we have less service per capita than formerly or does it mean that our demand has increased? Table 9H gives a fairly definite answer to this query.

It is clear that, from 1909 to 1914, the growth of railway service just about kept pace with population but that, since 1915, the supply of railway service has far outstripped the growth in numbers of people, with the result that, in 1917, the output was nearly fifty per cent larger than in

TABLE 9H

THE PER CAPITA SERVICE RENDERED TO THE PEOPLE OF THE CONTINENTAL UNITED STATES BY THE RAILWAY, SWITCHING, AND TERMINAL COMPANIES[a]

Calendar year	Estimated population of the Continental United States (Thousands) [b]	Freight carried; Ton miles per capita	Passenger miles traveled per capita	Net value produced per capita by railway industry	
				At prices current in given year	At prices of 1914 [c]
1909.....	90,370	2,621	340	$20.54	$20.08
1910.....	92,229	2,758	355	22.00	21.53
1911.....	93,811	2,760	354	21.82	21.39
1912.....	95,338	2,976	357	22.51	22.35
1913.....	97,278	3,050	364	22.42	22.42
1914.....	99,194	2,851	343	20.38	20.38
1915.....	100,428	3,075	330	21.89	21.93
1916.....	101,722	3,585	344	25.54	25.93
1917.....	103,059	3,853	388	28.96	29.05
1918.....	104,182	3.924	415	34.27	29.07

[a] For origin of data, see Tables 9E and 9F.
[b] Read from a smooth curve based upon Census figures.
[c] Figures in preceding column divided by price index shown in Table 9G.

1914. If the supply of railway service is inadequate, it appears, therefore, that this condition arises from an increasing demand and not from a diminishing supply.

§ 9f. The Purchasing Power of the Shares in the Net Value Product

Table 9E showed how the net value product has been divided among the principal classes of claimants thereto, but the absolute amounts there recorded have relatively little significance, because of the radical changes in the purchasing power of money which have taken place during the last decade. In order to give meaning to these figures, it is necessary to divide them by appropriate price indices. In Table 9I, this process has been applied to the compensation of the employees and in Table 9J, the share of the security holders and other property owners is similarly dealt with. The price indices employed for this purpose are those described in §§ 2b and 2c. The reasons for their use have been stated in § 1k and need not be repeated here.

TABLE 9I

THE NUMBER OF EMPLOYEES AND THE AVERAGE COMPENSATION RECEIVED BY THEM FROM RAILWAYS, SWITCHING, AND TERMINAL COMPANIES

A	B	C	D	E	F	G	H
Calendar year	Estimated number of employees actually at work [a] (Thousands)	Estimated fraction of full time that average worker was employed [b]	Estimated number of employees attached to industry (Thousands) B ÷ C	Total compensation paid to employees [c] (Millions)	Average annual compensation per employee E ÷ D	Average index of prices of goods bought by manual and clerical workers [d]	Average annual compensation at the prices of 1913 F ÷ G
1909	1,641	.962	1,705	$1,105	$ 648	.955	$679
1910	1,742	.981	1,775	1,219	687	.978	702
1911	1,750	.963	1,818	1,277	702	.984	713
1912	1,817	.990	1,834	1,367	745	.994	750
1913	1,814	.988	1,836	1,434	781	1.000	781
1914	1,604	.873	1,838	1,328	723	1.01	716
1915	1,575	.856	1,840	1,339	728	1.03	707
1916	1,744	.947	1,842	1,566	850	1.10	773
1917	1,834	.988	1,856	1,990	1,072	1.29	831
1918	1,937	.989	1,958	2,763	1,411	1.58	893

[a] See Table 9F.
[b] See § 2d.
[c] See Table 9E.
[d] See Table 2C.

The figures in Table 9I show that the average annual compensation paid by railways to their employees has risen materially since 1909, the increase up to 1918, when measured in purchasing power, amounting to something over thirty per cent. During this period, therefore, the increase in money earnings more than kept pace with the rise in the value of commodities consumed by the working classes. The facts brought out do not show, however, whether this increase in earning power has resulted from a monopolistic organization of wage earners, from increased efficiency of the wage earners, from an increase in the supply of railway equipment as compared to railway laborers, from a general increase in the wage level, or from some entirely different cause.

The purchasing power of the total share of the security holders increased rather steadily up to 1914, but, since that date, has fallen materially, until in 1918, it was smaller than in 1909. This change in the total tells nothing concerning the income per dollar invested. Since, however, it is believed that the total investment in the railway business has been increasing, it appears that the recent decline in the total income of the security holders must have been accompanied by a considerably greater fall in the returns per unit of investment.

TABLE 9J

THE PURCHASING POWER OF THE ESTIMATED SHARE OF THE SECURITY HOLDERS IN THE VALUE PRODUCT OF STEAM RAILWAYS, SWITCHING, AND TERMINAL COMPANIES IN THE CONTINENTAL UNITED STATES

Calendar year	Disbursements to security holders			Corporate savings		
	Amount in dollars [d]	Index of prices of articles consumed by wealthy classes [a]	Purchasing power in terms of prices of 1913 [c]	Amount in dollars [d]	Index of construction costs [b]	Value of construction purchasable at prices of 1913 [c]
1909	$568	.973	$584	$177	.927	$191
1910	633	.988	640	171	.953	179
1911	664	.995	667	100	.945	105
1912	650	1.000	650	88	.983	90
1913	685	1.000	685	20	1.000	20
1914	702	1.010	695	—17	.980	—18
1915	680	.996	683	172	.992	173
1916	709	1.074	661	314	1.194	263
1917	704	1.198	587	281	1.473	191
1918	682	1.364	500	117	1.499	78

[a] See Table 2E, based upon families spending $25,000, each annually.
[b] For derivation see Table 5L, note g.
[c] Amount in dollars divided by the price index.
[d] See Table 9E.

CHAPTER 10

PULLMAN CAR TRANSPORTATION

§ 10a. Available Information

This adjunct of the railway industry has been covered in moderate detail by the Interstate Commerce Commission in its statistics for each year since 1910. The reports for dates preceding 1916 are for fiscal years; hence, in order to reduce the information to a calendar year basis, the simple, though somewhat inaccurate, expedient of averaging the items for the two overlapping fiscal years has been adopted. For 1916 and later periods, the accounts have been kept for the calendar years, and therefore require no adjustment in this respect. No complete information for years preceding 1911 is available, but the rough estimates shown in the accompanying tables have been based upon the annual financial reports of the Pullman Company as they are quoted in Moody's *Manual of Industrials* for 1919.

§ 10b. The Share of the Stockholders

Following the customary procedure, the first step is to ascertain the total disbursements to investors of income arising from the operations of this industry. To arrive at this figure, the receipts from other corporations in the form of dividends or interest on funded debt have been subtracted from the dividends paid by the Pullman Company. The amounts shown by the reports of the Interstate Commerce Commission to have been "carried forward to the credit of profit and loss" are regarded as net corporate savings for the year. These savings, plus the net amounts disbursed in the form of dividends, are assumed to represent the entire share of the stockholders in this industry. Table 10A sets forth the facts in this connection.

In Table 10B the same items have been adjusted to show the purchasing power of the income of the stockholders if prices had remained stationary at the level of 1913. This method gives a far clearer picture of the changes which have actually occurred in the share under consideration, than does a comparison of the crude money income for the various years.

A study of the two following tables shows that, while the nominal share of the stockholders has been diminishing to a moderate degree, the fall in the purchasing power of this share has been very marked. Although

TABLE 10A

THE ESTIMATED[a] SHARE OF THE STOCKHOLDERS IN THE VALUE PRODUCT OF PULLMAN TRANSPORTATION IN THE CONTINENTAL UNITED STATES

(Values in Thousands of Dollars)

A	B	C	D	E	F
Year	Gross dividends paid	Received from other companies as dividends or interest on funded debt	Net dividends paid B — C	Corporate savings[e]	Total share of stockholders D + E
1909.....	$8,100 ac	$190 d	$7,910	$9,500 af	$17,410
1910.....	8,875 ac	190 d	8,685	7,850 af	16,535
1911.....	9,442 ab	191 ab	9,251	2,414 ab	11,665
1912.....	9,440 ab	196 ab	9,244	3,126 ab	12,370
1913.....	9,440 ab	190 ab	9,250	3,308 ab	12,558
1914.....	9,468 ab	188 ab	9,280	2,486 ab	11,766
1915.....	9,501 ab	189 ab	9,312	2,607 ab	11,919
1916.....	9,529 b	180 b	9,349	2,174 b	11,533
1917.....	9,544 b	247 b	9,297	3,862 b	13,159
1918.....	9,544 b	337 b	9,207	787 b	9,994

[a] Averages of the quantities for the two calendar years overlapping on the fiscal year.

[b] Data taken from last page of each of the respective annual *Preliminary Abstracts of Statistics of Common Carriers*, Compiled by the Interstate Commerce Commission.

[c] Dividends as shown by Moody's *Manual of Industrials* multiplied by 0.965, this being the ratio thereto, in 1911, of the amounts reported to the Interstate Commerce Commission as paid in dividends.

[d] A guess based on the records for the succeeding six years.

[e] Entitled by the Interstate Commerce Commission "Balance Carried Forward to Credit of Profit and Loss."

[f] The average surplus for 1911, 1912, and 1913 shown by the Interstate Commerce Commission reports was 2.349 times as great as that shown by the report in Moody's *Manual of Statistics*. The items in the latter report for 1909 and 1910 have therefore been multiplied by 2.349. It is not unlikely that the results thus obtained are considerably in error.

figures showing the actual investments have not been compiled, it appears that the total amount invested in the industry has been constantly growing larger through accumulations of surplus or savings, hence the decline in income per unit of invested resources is, necessarily, steeper than the fall indicated by the figures recorded in the last column of Table 10B.

TABLE 10B

THE PURCHASING POWER OF THE STOCKHOLDERS' SHARE OF THE INCOME OF THE PULLMAN COMPANY

A	B	C	D	E	F	G
Calendar year	Net dividends paid by Pullman Company [a] (Thousands)	Index of prices of consumption goods purchased by families spending $25,000 annually therefor [b]	Purchasing power of dividends at prices of 1913 (Thousands) B/C	Corporate savings of Pullman Company [a] (Thousands)	Index of construction costs [c]	Purchasing power of corporate savings at prices of 1913 (Thousands) E/F
1909	$7,910	.973	$8,129	$9,500	.920	$10,326
1910	8,685	.988	8,790	7,850	.962	8,160
1911	9,251	.995	9,297	2,414	.941	2,565
1912	9,244	1.000	9,244	3,126	.937	3,233
1913	9,250	1.000	9,250	3,308	1.000	3,308
1914	9,280	1.010	9,188	2,486	.969	2,566
1915	9,312	.996	9,349	2,607	.998	2,612
1916	9,349	1.074	8,705	2,174	1.200	1,812
1917	9,297	1.198	7,760	3,862	1.453	2,658
1918	9,207	1.364	6,750	787	1.550	508

[a] See Table 10A.
[b] Computed by means of a special study; see Table 2E.
[c] Arithmetic average of indices; wages of building laborers (see § 7e), weighted 9 and the Bureau of Labor Statistics indices shown in Bulletin 269 weighted as follows: Metals and metal products 5, Doors, Small plate glass, Window-glass, Maple (hard), Oak (white quartered), and Lead Carbonate, each 1.

§ 10c. Share of the Employees in the Net Value Product

The next problem is to ascertain the number of the employees and the share of the total value product which they receive. Part of the pay of Pullman employees comes in the form of tips directly from the passengers and hence does not appear on the records of the company. This is, nevertheless, quite evidently part of the value product of the industry, for it is considered by everyone as part of his expenses of travel. An estimate for tips is therefore included here as part of the share of the employees. The figures appear in Table 10C.

TABLE 10C

THE ESTIMATED SHARE OF THE EMPLOYEES IN THE VALUE PRODUCT ARISING FROM PULLMAN TRANSPORTATION

Year	Number of employees at work on June 30th	Average rate of pay per day for employees	Total wages paid to employees (Thousands)	Total tips paid to porters [h] (Thousands)	Total share of employees [i] (Thousands)
1909....	13,800 [a]	$1.65 [d]	$ 7,910 [ae]	$2,352 [ae]	$10,262
1910....	14,770 [a]	1.68 [d]	8,820 [ae]	2,520 [ae]	11,340
1911....	15,024 [b]	1.73 [be]	9,175 [f]	2,563 [e]	11,738
1912....	15,129 [b]	1.84 [be]	9,827 [f]	2,724 [e]	12,551
1913....	20,812 [b]	1.96 [be]	14,399 [f]	2,854 [e]	17,253
1914....	20,110 [b]	1.96 [be]	13,914 [f]	2,823 [e]	16,737
1915....	19,106 [b]	1.94 [be]	13,084 [f]	2,926 [e]	16,010
1916....	19,894 [b]	2.04 [b]	14,326 [f]	3,053	17,379
1917....	19,276 [bc]	2.23 [b]	15,174 [f]	3,802	18.976
1918....	18,985 [bc]	3.05 [b]	20,440 [f]	3,883	24,323

[a] Assumed to vary in proportion to total revenues, using the quantities in 1911 as a base.

[b] Taken from last page of each of the annual *Preliminary Abstracts of Statistics of Common Carriers*, published by the Interstate Commerce Commission.

[c] Average of the numbers reported employed at the beginning and at the end of the year.

[d] Total wages divided by total number of employees.

[e] Averages of the quantities for the two fiscal years overlapping on the calendar year.

[f] Product of the items in the two preceding columns multiplied by 353, this figure being the estimated number of days per year for which an employee is paid. Most of the employees work by the month, but a minority are employed by the day.

[g] Assumed to vary in proportion to operating expenses, using the quantities in 1911 as a base.

[h] Assumed to equal 20 cents per berth passenger; number of berth passengers as recorded in the Annual *Preliminary Abstracts of Statistics of Common Carriers* published by the Interstate Commerce Commission.

[i] Sum of items in two preceding columns.

Table 10D combines the data of Tables 10A and 10C and shows the relative shares of the value products of this industry going respectively to the employees and to the stockholders. The figures in the last column show a rapid increase in the fraction of the value product which the employees receive as their share, the increase in 1918 being very striking.

TABLE 10D

THE ESTIMATED VALUE PRODUCT ARISING FROM PULLMAN TRANSPORTATION AND THE DIVISION OF THIS PRODUCT BETWEEN THE EMPLOYEES AND THE STOCKHOLDERS

Year	Thousands of dollars			Per cent of the value product going to the employees
	Share of stockholders [a]	Share of employees [b]	Total value product of the industry	
1909	$17,410	$10,262	$27,672	37.1
1910	16,535	11,340	27,875	40.7
1911	11,665	11,738	23,403	50.2
1912	12,370	12,551	24,921	50.4
1913	12,558	17,253	29,811	58.0
1914	11,766	16,737	28,503	58.7
1915	11,919	16,010	27,929	57.3
1916	11,533	17,379	28,912	60.1
1917	13,159	18,976	32,135	59.1
1918	9,994	24,323	34,317	70.9

[a] See Table 10A.
[b] See Table 10C.

§ 10d. Average Annual Earnings of Employees

An increase in the relative share of the product does not necessarily indicate an absolute gain in the average well being of the workers. Table 10E represents an effort to show whether the economic condition of the employees in the Pullman industry has improved or grown worse during the decade under consideration.

TABLE 10E

THE ESTIMATED NUMBER OF EMPLOYEES ATTACHED TO THE PULLMAN INDUSTRY AND THE PURCHASING POWER OF THE AVERAGE INCOME WHICH THEY DERIVE THEREFROM

A	B	C	D	E	F	G	H
Year	Number of employees actually working [a]	Estimated fraction of employees actually working [b]	Estimated number of employees attached to industry B ÷ C	Total earnings of employees [a] (Thousands)	Average earnings per employee E ÷ D	Index of prices of goods consumed by manual and clerical workers [c]	Average earnings in purchasing power F ÷ G
1909	13,800	.962	14,340	$10,262	$ 716	.955	$749
1910	14,770	.982	15,040	11,340	754	.978	771
1911	15,024	.969	15,500	11,738	757	.984	770
1912	15,129	.953	15,880	12,551	790	.994	795
1913	20,812	.979	21,250	17,253	812	1.00	812
1914	20,110	.935	21,500	16,737	778	1.01	771
1915	19,106	.904	21,130	16,010	758	1.03	736
1916	19,894	.975	20,400	17,379	852	1.10	774
1917	19,276	.979	19,680	18,976	964	1.29	747
1918	18,985	.984	19,300	24,323	1,260	1.58	798

[a] See Table 10C.
[b] A rough estimate derived by means of a special study; see § 2d.
[c] The U. S. Bureau of Labor Statistics index carried back by means of a special study; see Table 2C.

Table 10E makes it clear that while the Pullman employees received a much higher average money compensation in 1918 than in 1909, the purchasing power of their income from labor was but slightly higher at that date than in the first year mentioned.

§ 10e. The Annual Output per Employee

Average earnings are of great importance from the standpoint of the employees. The employer, on the other hand, is likely to view labor largely in its relationship to production. He is interested in the amount of work accomplished per employee hired. Apparently the best measure of this ratio obtainable from the records of the Pullman industry is the number of car days in proportion to the number of employees. Car days are used instead of car miles because the Pullman employees have little to do with moving the cars in which they work. The number of employees actually working rather than the number attached to the industry is chosen as a divisor, not only because the figures for the former are n

TABLE 10F

THE RELATION OF THE NUMBER OF CAR DAYS TO THE NUMBER OF EMPLOYEES ACTUALLY AT WORK IN THE PULLMAN INDUSTRY

Year	Number of car days	Number of employees actually at work [d]	Car days per working employee
1909	[b]	[b]	[b]
1910	[b]	[b]	[b]
1911	1,614,843 [ac]	15,024	107.5
1912	1,888,515 [ac]	15,129	124.8
1913	2,162,321 [ac]	20,812	103.9
1914	2,153,147 [ac]	20,110	107.1
1915	2,150,990 [ac]	19,106	112.6
1916	2,181,166 [c]	19,894	109.6
1917	2,374,029 [c]	19,276	123.2
1918	2,187,735 [c]	18,985	115.2

[a] Averages of the quantities for the two fiscal years overlapping on the calendar year.
[b] Data incomplete, hence no significant ratios can be computed for these years.
[c] Taken from the last page of each of the annual *Preliminary Abstracts of Statistics of Common Carriers*, published by the Interstate Commerce Commission.
[d] See Table 10C.

accurate, but also because the employer pays wages only to those actually at work.

While the output per employee varies greatly from year to year, there appears to be no definite trend either upward or downward. One is not justified, therefore, in concluding that the output per Pullman employee has either increased or diminished during the eight years covered by this study.

§ 10f. Relative Growths of Pullman Service and Population

The final inquiry in this investigation has as its end an attempt to answer the question, "Is the Pullman service keeping pace with the growth of population?" Table 10G throws light upon this matter. For this purpose, car miles have been compared to population; for, apparently, the car mile is the factor in which the public is most interested. The fact should be noted, however, that any changes in the per capita volume of service measured on this basis are to be ascribed as much to the railways as to the Pullman companies, since the coöperation of both is necessary to produce Pullman car mileage.

TABLE 10G

PULLMAN CAR MILEAGE PER CAPITA IN THE CONTINENTAL UNITED STATES

Year	Number of car miles (Thousands)	Population of the United States [d] (Thousands)	Car miles per capita
1909	[a]		
1910	[a]		
1911	641,723 [bc]	93,811	6.84
1912	674,375 [bc]	95,338	7.07
1913	704,341 [bc]	97,278	7.24
1914	700,623 [bc]	99,194	7.06
1915	708,323 [bc]	100,428	7.05
1916	714,916 [b]	101,722	7.03
1917	775,407 [b]	103,059	7.52
1918	697,213 [b]	104,182	6.69

[a] Information lacking; hence, no significant ratios can be computed for these years.
[b] Taken from the last page of each of the annual *Preliminary Abstracts of Statistics of Common Carriers*, published by the Interstate Commerce Commission.
[c] Averages of the quantities for the two fiscal years overlapping on the calendar year.
[d] Estimated by means of a special study; see § 2a.

Table 10G shows that Pullman service varies with demand and fluctuates to a considerable degree. The years 1917 and 1918 showed large oscillations, presumably due to war conditions. The figures as a whole, scarcely indicate either an upward or downward trend in the amount of service furnished per capita.

CHAPTER 11

EXPRESS COMPANIES

§ 11a. Introduction

A very good annual report entitled "Statistics of Express Companies" is published by the Interstate Commerce Commission. This report makes it possible to obtain a fairly complete and accurate statement of the amount and distribution of the value product of this branch of industry.

§ 11b. Disbursements to Security Holders and Building Owners

The withdrawals from the Express business by entrepreneurs and investors consist of dividends and bond interest. Owners of buildings obtain a considerable revenue from the rent of those buildings which are devoted to the Express business. These items together constitute the value withdrawals going to entrepreneurs and other property owners.

The dividends and interest received by security holders in Express Companies originate to no small degree in dividends and interest on bonds paid to the Express Companies by other corporations. For the reasons set forth in § 9b, the Express Companies must be thought of merely as agents who pass this income along to the final recipients. Table 11A has been constructed on this basis. It reveals the great irregularity in the amounts paid as bond interest or dividends and shows the rapid decline during the decade in the total disbursements to the security holders.

§ 11c. Total Share of Security Holders and Building Owners

The share of the security holders and other property owners in the current income consists of receipts in hand plus corporate savings. Table 11B shows that, during seven years out of the ten, the corporations diminished their assets,—in other words, part or all of the dividends declared were paid out of past savings rather than from current earnings. In 1918, the deficit became far larger than the total withdrawals, the propertied classes losing during the year on their Express Company interests $14,003,000.

In order to make the magnitude of the various sums show the changes in the ability of the propertied classes to buy consumption goods with that part of their income received from Express Companies in the various years, each item has been divided by a price index representing the approximate

TABLE 11A

DISBURSEMENTS TO ENTREPRENEURS AND OTHER PROPERTY OWNERS OF VALUE PRODUCT ORIGINATING IN THE EXPRESS INDUSTRY

Year	Values in Thousands of Dollars				
	Total dividends [a] and bond interest paid by Express Companies	Dividends and bond interest received by Express Companies from other corporations	Dividends and bond interest originating in Express industry [n]	Rents paid for use of offices [b]	Total withdrawals by entrepreneurs and other property owners
1909 [m]	$20,518 [c]	$3,417 [c]	$17,101	$1,567 [c]	$18,668
1910 [m]	24,365 [d]	4,233 [d]	20,132	1,641 [d]	21,773
1911 [m]	11,716 [e]	4,689 [e]	7,027	1,771 [e]	8,798
1912 [m]	8,460 [f]	4,522 [f]	3,938	1,949 [f]	5,887
1913 [m]	7,501 [g]	4,095 [g]	3,406	2,066 [g]	5,472
1914 [m]	5,452 [h]	3,208 [h]	2,244	2,093 [h]	4,337
1915 [m]	6,590 [i]	3,134 [i]	3,456	2,080 [i]	5,536
1916	16,064 [j]	3,677 [j]	12,387	2,127 [j]	14,514
1917	4,976 [j]	3,722 [j]	1,254	2,264 [j]	3,518
1918	2,152 [k]	1,405 [k]	747	2,435 [k]	3,182

[a] Paid either from current income or surplus.

[b] The amount here entered is 70 per cent of the amount paid by the Express Companies, the assumption being that only this fraction accrues as net rent to the owners of the offices, the rest being necessary to cover depreciation, repairs, etc.

E. = *Annual Report on the Statistics of Express Companies*, by the Interstate Commerce Commission.

[c] E. for 1910, pp. 15 and 26.
[d] E. for 1911, pp. 13 and 23.
[e] E. for 1912, pp. 13 and 23.
[f] E. for 1913, pp. 13 and 23.
[g] E. for 1914, pp. 13 and 21.
[h] E. for 1914, pp. 13 and 21.
[i] E. for 1915–16, pp. 11, 12 and 17.
[j] E. for 1916–17, pp. 11, 12 and 17.
[k] E. for 1918, pp. 11, 13, and 15.

[m] Each of the quantities stated is half of the sum for the two fiscal years which overlap on the given calendar year.

[n] Excess of items in second column over those in third.

average relative prices of consumption goods purchased at each date by the wealthier classes of the population of the United States.

TABLE 11B

TOTAL SHARE OF ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE VALUE PRODUCT OF THE EXPRESS INDUSTRY (AMOUNTS WITHDRAWN, PLUS CORPORATE SAVINGS)

A	B	C	D	E	F	G	H
	Value in thousands of dollars at the given date					Values in thousands at prices of 1913 [d]	
Year	Total share	Amounts disbursed to property owners [a]	Corporate savings [b]	Index of prices of goods consumed by wealthy families	Index of wholesale prices [c]	Amounts disbursed to property owners C ÷ E	Corporate savings D ÷ F
1909 [e]	$15,698	$18,668	—$2,970	.973	.97	$19,186	—$3,062
1910 [e]	14,895	21,773	— 6,878	.988	.99	22,037	— 6,947
1911 [e]	11,054	8,798	2,256	.995	.95	8,842	2,375
1912 [e]	7,983	5,887	2,096	1.000	1.01	5,887	2,075
1913 [e]	4,816	5,472	— 656	1.000	1.00	5,172	— 656
1914 [e]	3,830	4,337	— 507	1.010	1.00	4,294	— 1,507
1915 [e]	8,692	5,536	3,156	.996	1.01	5,558	3,125
1916	10,957	14,514	— 3,557	1.074	1.24	13,514	— 2,869
1917	2,162	3,518	— 1,356	1.198	1.76	2,937	— 770
1918	—14,003	3,182	—17,185	1.364	1.96	2,333	— 8,768

[a] See Table 11A, last column.

[b] Includes "Income appropriations for investment in physical property" plus "Balance transferred to profit and loss" minus "Dividend appropriations of surplus." For data, see the "Income" and "Profit and Loss" accounts in the various Annual Reports by the Interstate Commerce Commission, on *The Statistics of Express Companies.*

[c] Each of the quantities stated is half of the sum for the two fiscal years which overlap on the given calendar year.

[d] Money values divided by the respective price indices.

[e] U. S. Bureau of Labor Statistics, Bulletin 269, on *Wholesale Prices*, p. 15.

§ 11d. The Share of the Employees

Table 11C indicates the amount of the value product of each year going to employees. This consists largely of wages and salaries, but there is included an important item entitled "Commissions." The auditor of the American Railway Express Company states that practically all of this amount is paid to railway agents at small stations as compensation for their efforts in handling Express business. It has been arbitrarily assumed that 70 per cent of the amount paid by Express Companies for "Injuries to Persons" reaches the pockets of employees. The amount is too small to be of moment. Similarly, there is included the trivial item of "Pensions." The combination of the above items gives the estimated total share of the employees.

TABLE 11C

THE SHARE OF THE EMPLOYEES IN THE TOTAL VALUE PRODUCT OF THE EXPRESS INDUSTRY

(Values in Thousands of Dollars)

A	B	C	D	E	F	G	H	I
Year	Wages and salaries [a]	Indemnity for personal injuries [ab]	Pensions [a]	Total compensation to full time employees B+C+D	Commissions [a]	Total share of employees E+F	Index of prices of goods bought by manual and clerical workers [d]	Share of employees at price level of 1913 G ÷ H
1909 [c]	$36,230	$104	$125	$36,459	$6,922	$43,381	.955	$45,425
1910 [c]	39,238	134	135	39,507	7,489	46,996	.978	48,053
1911 [c]	42,445	146	151	42,742	7,906	50,648	.984	51,472
1912 [c]	45,710	151	164	46,025	8,173	54,198	.994	54,525
1913 [c]	46,774	172	181	47,127	7,988	55,115	1.000	55,115
1914 [c]	43,926	190	209	44,325	7,320	51,645	1.01	51,134
1915 [c]	44,510	200	245	44,955	7,421	52,376	1.03	50,850
1916	52,345	238	275	52,858	8,502	61,360	1.10	55,796
1917	64,356	312	310	64,978	9,382	74,360	1.29	57,643
1918	82,437	449	317	83,203	10,240	93,443	1.58	59,141

[a] All data taken from the "Analyses of Operating Expenses" in the Annual Reports by the Interstate Commerce Commission on *The Statistics of Express Companies.*

[b] 70 per cent of payments made by Express Companies.

[c] Each of the quantities stated is half of the sum for the two fiscal years which overlap on the given calendar year.

[d] U. S. Bureau of Labor Statistics index carried back by this Bureau. For details see Table 2C.

Table 11C shows that, while the share of the property owners has been diminishing, labor has been getting an increasing absolute share in the product of the Express industry. Since the number of employees is not recorded, there is no way of determining accurately whether the compensation per employee has increased or diminished during the decade.

§ 11e. The Total Net Value Product and Its Distribution

In Table 11D appears an estimate of the entire value product of the Express industry. To the shares of the propertied classes and of the employees has been added a small item entitled "Uncollectible Revenue from Transportation." This has been done because the value received by the shipper in such cases is evidently a part of his income and also a part of the product of the Express industry; although it does not accrue to either the Express Companies or their employees. However, the amount is too small to be of consequence.

TABLE 11D

THE ESTIMATED NET VALUE PRODUCT PER CAPITA OF THE EXPRESS INDUSTRY IN THE CONTINENTAL UNITED STATES AND THE PER CENT OF THE NET PRODUCT GOING TO THE EMPLOYEES

A	B	C	D	E	F	G	H	I	J
	(Amounts in thousands)								
	Share of entrepreneurs and other property owners [b]	Share of employees[c]	Uncollectible charges for transportation	Total value product of industry B+C+D	Per cent of value product going to employees C÷E	Population of United States[f] (Thousands)	Value product per capita E÷G	Index of prices of Express service [g]	Per capita value product at prices of Express service in 1913 $\frac{100\ H}{I}$
1909[a]	$15,698	$43,381	$20[e]	$59,099	73.4	90,370	$0.65	100.0	$0.65
1910[a]	14,895	46,996	20[e]	61,911	75.9	92,229	.67	100.0	.67
1911[a]	11,054	50,648	20[e]	61,722	82.1	93,811	.66	100.0	.66
1912[a]	7,983	54,198	20[e]	62,201	87.1	95,338	.65	100.0	.65
1913[a]	4,816	55,115	20[e]	59,951	91.9	97,278	.62	100.0	.62
1914[a]	3,830	51,645	20[d]	55,495	93.1	99,194	.56	100.0	.56
1915[a]	8,692	52,376	28[d]	61,096	85.7	100,428	.61	89.5	.68
1916	10,957	61,360	41[d]	72,358	84.8	101,722	.71	89.5	.79
1917	2,162	74,360	71[d]	76,593	97.1	103,059	.74	89.5	.83
1918	—14,003	93,443	76[d]	79,516	117.5	104,182	.76	98.6	.77

[a] Each of the quantities stated is half of the sum for those two fiscal years which overlap on the given calendar year.
[b] See Table 11B.
[c] See Table 11C.
[d] From Income Accounts in Annual Reports of the Interstate Commerce Commission on the *Statistics of Express Companies*.
[e] Assumed same as in 1914.
[f] See Table 2A.
[g] Roughly estimated from the *Reports of the Interstate Commerce Commission*, Vol. XXXV, p. 6, and Vol. L, p. 385.

The conclusion to be drawn from Table 11D is that during the decade the amount of service rendered by the Express Companies has more than kept pace with the growth of population. The index of prices of Express service is based on very poor data and hence the figures in the last column of Table 11D are not accurate. However, it seems probable that the broad conclusion just stated accords with the facts.

Column F of the table shows that the relative share of labor in the value product of the industry increased greatly, until, in 1918, it absorbed not only the entire value product but also fourteen millions of dollars from the assets which the companies had accumulated in past years. This means that it was necessary to draw upon the value products of other industries in order to obtain sufficient income to pay the employees for the work done in carrying on the Express business. This draft on other industries was possible because the Express Companies had in former years accumulated large surpluses mainly in the form of investments, or, in other words,

claims to assets employed in other fields. Stocks and bonds of outside corporations are examples of such claims. Such securities can, of course, be readily sold and the money thus obtained may be used to meet current expenses.

§ 11f. The Number of Employees

As previously mentioned, no record has been found of the number of employees engaged in this field of work, yet it is essential for the general purposes of this study that the number be estimated. The United States Bureau of Labor Statistics in its bulletins on *The Union Scales of Wages and Hours of Labor* gives rates for teamsters in all sections of the country. The Interstate Commerce Commission, in its Statistics of Railways, presents figures which enable one to compute the average salaries for office workers from year to year. It has been assumed that a combination of the rates for teamsters and office workers,[1] giving the former twice the weight of the latter, might represent fairly well the average earnings of Express employees for full time work. Before 1913, only the railway data are available, hence the average has been carried back for earlier years in proportion to the variations in those figures only. The results of this computation are presented in Table 11E.

The average fraction of those employees attached to the industry who were at work in the various years has been assumed to be very similar to that calculated as representing the railway workers. Certain adjustments have been made in order to make the fractions conform to the idea that the number of persons attached to any industry normally tends to vary along a smooth curve rather than in an irregular fashion. Table 11E shows the estimates which have been arrived at. This completes the usual list of inquiries in so far as the nature of the available data will permit.

[1] Office workers include division officers, clerks, and station agents, masters, and employees.

TABLE 11E

AN ESTIMATE OF THE NUMBER OF PERSONS NORMALLY DEPENDENT FOR A LIVING UPON EMPLOYMENT WITH THE EXPRESS COMPANIES OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F
Calendar year	Total wages and salaries paid [a] (Thousands)	Estimated average annual full-time money wage [b]	Estimated average number of employees actually at work B ÷ C	Estimated fraction of those attached to industry actually at work [c]	Estimated number of employees attached to industry D ÷ E
1909	$36,230	$640	56,609	.963	58,784
1910	39,238	635	61,900	.985	62,800
1911	42,445	663	64,020	.963	66,430
1912	45,710	670	68,224	.985	69,263
1913	46,774	684	68,383	.968	70,644
1914	43,926	698	63,648	.887	71,756
1915	44,510	699	63,678	.869	73,277
1916	52,345	728	71,902	.948	75,845
1917	64,356	770	83,579	.939	84,509
1918	82,437	938	87,886	.989	88,863

[a] See Table 11C, Column B.
[b] For mode of derivation, see text.
[c] Derived by a special study described in Sec. 2d.

CHAPTER 12

STREET AND ELECTRIC RAILWAYS

§ 12a. Census Data Available

The task of estimating the value product of the street and electric railways of the country is made relatively easy by the existence of three Censuses taken in 1907, 1912, and 1917 respectively. These Censuses seem very complete and give most of the information in the form necessary for this study.

§ 12b. Share of Security Holders and Other Property Owners

In the *Census of Electric Railways*, the term "gross income" means the amount remaining from the entire income after operating expenses and taxes have been paid. Since it is evident that practically all the value product of this industry must arise from the activities of *operating* companies only, the gross income of this class of companies is taken as a starting point. From this sum, however, must be deducted a number of items before arriving at the amounts available for disbursement to security holders or as payment for leased property. These items may be enumerated as follows:—

1. Income received as dividends or interest on the bonds of other corporations. Such amounts must be deducted because, under the plan of procedure determined upon, they are counted in the value product of the industry in which the paying corporation is engaged.

2. Taxes and expenses of lessor street railway companies. These amounts are deducted because they do not go to investors in street railways.

3. Interest on unfunded debt. This is presumably paid mostly to banks and will be considered in their income when dealing with that field.

4. Miscellaneous debits. Items under this head are stated by the Census to consist mainly of taxes on securities, losses incurred, etc. These items evidently are deductions from the amounts going to investors in the street railway field.

Table 12A shows the net results of these calculations for the Census years.

TABLE 12A

THE SHARE OF SECURITY AND PROPERTY OWNERS IN THE NET VALUE PRODUCT OF THE STREET AND ELECTRIC RAILWAYS OF THE CONTINENTAL UNITED STATES IN THE CENSUS YEARS

(Values in Thousands of Dollars)

Year	Gross income as reported by Census [b]	Deductions [a]	Available for bond interest, dividends, rents and surplus
1907.....	$158,679	$26,541 [c]	$132,138
1912.....	218,006	29,121 [f][d]	188,885
1917.....	231,757	26,598 [e]	205,159

[a] See text for description.
[b] *U. S. Census of Street and Electric Railways* for 1917, pp. 13–14.
[c] *U. S. Census of Street and Electric Railways* for 1907, pp. 123–125; 142.
[d] *U. S. Census of Street and Electric Railways* for 1912, pp. 236; 245; 250.
[e] *U. S. Census of Street and Electric Railways* for 1917, pp. 14; 78; 83.
[f] The interest on the unfunded debt was estimated at 9.9% of all interest, this being an average of the percentages for 1907 and 1917. The estimated amount for 1912 was 9,710 thousands of dollars.

The interpolation of the share of entrepreneurs and other property owners for the intercensal years is shown in Table 12B. It is based upon the assumption that changes in the net share are proportionate to changes in the net operating revenue of the companies. Since the two quantities are so nearly identical, the error from this assumption is certain to be slight.

The figures for net operating revenue for intercensal years since 1913 are taken from the estimates made by the Deputy Public Service Commissioner of New York. These estimates are said to have been made after extensive investigation. For the years 1909 to 1913 inclusive, he presents no information; hence use has been made of a compilation of the data shown in the annual reports of a number of the leading street railways of the United States.

It is believed that the final estimates derived in the manner just stated are close to the truth and are sufficiently accurate for all practical purposes. The figures appear in Table 12B.

TABLE 12B

THE ESTIMATED AGGREGATE OF THE INTEREST, RENT, DIVIDENDS, AND SAVINGS OF THE STREET AND ELECTRIC RAILWAYS OF THE CONTINENTAL UNITED STATES

(Values in Thousands of Dollars)

A	B	C	D	E	F	G	H
Year	Net operating revenue of all companies; census figures [a]	Interest, dividends, and surplus of 28 typical companies [b]	Ratio of B to C	Estimated net operating revenue B × D	Sum of interest dividends rent and surplus; Census years [f]	Ratio of F to E	Estimated sum of interest dividends rent and surplus E × G
1907....	$166,879	$45,855	3.639 [c]	$166,879 [a]	$132,138	.792 [c]	$132,138 [f]
1909....		52,189	3.715 [d]	193,900		.799 [g]	154,800
1910....		55,310	3.748 [d]	207,300		.801 [g]	166,100
1911....		58,150	3.785 [d]	220,100		.804 [g]	177,000
1912....	234,615	61,430	3.819 [c]	234,615 [a]	188,885	.805 [c]	188,885 [f]
1913....				239,138 [e]		.805 [g]	192,400
1914....				243,661 [e]		.804 [g]	195,900
1915....				248,185 [e]		.802 [g]	199,100
1916....				252,707 [e]		.800 [g]	202,100
1917....	257,230			257,230 [a]	205,159	.798 [c]	205,159 [f]
1918....				155,669 [e]		.794 [g]	123,600

[a] *U. S. Census of Street and Electric Railways*, for 1917, pp. 13–14.
[b] Computed from data appearing in Poor's and Moody's *Manual of Statistics*.
[c] Computed.
[d] Interpolated along a straight line.
[e] Estimated by Alfred M. Barrett, Public Service Commissioner of New York. See *Annalist*, Jan. 5, 1920, p. 22.
[f] See Table 12A.
[g] Read from a smooth curve.

§ 12c. Share of the Employees

The Census reports separately wages and salaries for the different Census years, but it is stated that the distinctions between the two have perhaps changed somewhat and hence are of little value. For this reason, both are here combined. Since data for the intercensal years 1909, 1910, and 1911 are unavailable, estimates for those years have been made on the assumption that wages have varied along a smooth curve. In an industry as stable as that of street railways, and in a period characterized by no radical changes, this method should be fairly accurate. For the later years, the estimates of wages used are those furnished by Public Service Commissioner Barrett, and by the statistician of the American Electric Railway Association. Table 12C sets forth the evidence as it appears.

TABLE 12C

THE ESTIMATED DIVISION OF THE VALUE PRODUCT OF THE STREET AND ELECTRIC RAILWAYS OF THE CONTINENTAL UNITED STATES

(Values in Thousands of Dollars)

Year	Wages and salaries paid	Rents, interest, dividends, and surplus [h]	Total value product of industry [i]	Per cent of value product going to employees, as wages and salaries
1907.....	$150,991 [a]	$132,138	283,129	53.3
1909.....	170,900 [f]	154,800	325,700	52.5
1910.....	180,960 [f]	166,100	347,060	52.1
1911.....	191,400 [f]	177,000	368,400	52.0
1912.....	200,891 [a]	188,885	389,776	51.5
1913.....	213,950 [g]	192,400	406,350	52.7
1914.....	223,930 [cb]	195,900	419,830	53.3
1915.....	222,220 [cb]	199,100	421,320	52.7
1916.....	242,250 [db]	202,100	444,350	54.5
1917.....	267,240 [a]	205,159	472,399	56.6
1918.....	313,749 [e]	123,600	437,349	71.7

[a] *U. S. Census of Street and Electric Railways* for 1917, p. 13.
[b] Estimated from *Aera*, on basis of percentage change in cost of conducting transportation.
[c] *Aera*, Mar. 1917, p. 925.
[d] *Aera*, Mar. 1918, p. 795.
[e] Estimated in *Aera*, Aug. 1919, pp. 47–52.
[f] Interpolated along a smooth curve.
[g] Assumed to vary in proportion to operating expenses: see Barrett, Alfred M., *Annalist*, Jan. 5, 1920, p. 22.
[h] See Table 12B.
[i] Sum of two preceding columns.

§ 12d. Corporate Savings

Table 12C shows that, at the close of the period studied, there was a great increase in the share of the employees as contrasted with a sharp contraction in the share of property. As a rule, the corporate owners reserve a certain proportion of earnings as savings or "surplus." In 1918, however, the surplus disappeared and part of the distribution to stock and bond holders was made out of previous savings.

The estimates of the surplus for other years than those covered by the Census are interpolated on the basis of the reported surpluses of the twenty-eight representative companies previously mentioned and of the estimates of Public Service Commissioner Barrett. The figures appear in Table 12D.

They show that the percentage of corporate earnings saved fell sharply after 1911, but that about one-twentieth of the income was saved up to

1918, when a deficit occurred about equal to the savings of a normal year in the decade.

TABLE 12D

THE ESTIMATED CORPORATE SAVINGS OF THE STREET AND ELECTRIC RAILWAY COMPANIES OF THE CONTINENTAL UNITED STATES

(Values in Thousands of Dollars)

A	B	C	D	E	F	G
Year	Surplus of all companies in census years [a]	Surplus of 28 typical companies [b]	Ratio of B to C	Estimated savings of all companies C × D	Total share of entrepreneurs and property [f]	Per cent of share of entrepreneurs and property owners saved by corporations, as surplus E ÷ F
1907...	$14,303	$7,038	2.032 [c]	$14,303 [a]	$132,138	10.8
1909...		7,261	1.920 [d]	13,940	154,800	9.0
1910...		8,968	1.861 [d]	16,690	166,100	10.0
1911...		9,117	1.801 [d]	16,420	177,000	9.3
1912...	16,663	9,550	1.745 [c]	16,663 [a]	188,885	8.8
1913...		6,392	1.685 [d]	10,770	192,400	5.6
1914...				13,300 [e]	195,900	6.8
1915...				11,700 [e]	199,100	5.9
1916...				10,000 [e]	202,100	4.9
1917...	8,506			8,506 [a]	205,159	4.1
1918...				—12,100 [e]	123,600	—9.8

[a] *U. S. Census of Street and Electric Railways*, 1917, p. 14.
[b] Compiled from Poor's and Moody's *Manuals*.
[c] Computed.
[d] Interpolated along a straight line.
[e] Adjusted slightly to include surplus of lessor companies, but primarily the estimates of Alfred M. Barrett, in the *Annalist*, Jan. 5, 1920, p. 22.
[f] See Table 12B.

§ 12e. Average Annual Earning of Employees

The next question of interest is whether the average annual earnings of the employees attached to the industry are, in general, growing larger or smaller as the years pass. Since the purchasing power of the dollar has changed so greatly during the decade, it is also essential that the nominal money wage received by the average employee attached to the industry be divided by a suitable price index in order to ascertain the relative amounts which the various money payments would purchase on the dates when they were made. These two processes have been carried out in Table 12E.

TABLE 12E

THE AVERAGE NUMBER OF ELECTRIC RAILWAY EMPLOYEES AND THE AVERAGE ANNUAL PAY WHICH THEY RECEIVE FROM THE EMPLOYING COMPANIES

A	B	C	D	E	F	G	H
Year	Estimated average number of employees actually at work *f*	Estimated fraction of full time worked on the average *d*	Estimated number of employees attached to industry B ÷ C	Estimated total wages and salaries *a* (Thousands)	Average money earnings per year *d* E ÷ D	Average price index of goods consumed by manual and clerical workers *e*	Purchasing power of annual earnings at prices of 1913 F ÷ G
1907	221,429 *g*	.987	224,300 *b*				
1909	251,800 *f*	.968	260,000 *c*	$170,900	$657	95.5	$688
1910	266,100 *f*	.977	272,200 *c*	180,960	665	97.8	680
1911	273,600 *f*	.970	282,000 *c*	191,400	679	98.4	690
1912	282,461 *g*	.978	289,000 *b*	200,891	695	99.4	699
1913	284,100 *f*	.971	292,500 *c*	213,950	731	100.	731
1914	278,200 *f*	.942	295,000 *c*	223,930	759	101.	751
1915	276,000 *f*	.929	296,700 *c*	222,220	749	103.	727
1916	292,300 *f*	.982	298,000 *c*	242,250	813	110.	739
1917	294,826 *g*	.986	299,000 *b*	267,240	894	129.	693
1918	292,400 *f*	.977	299,700 *c*	313,749	1047	158.	663

a See Table 12C.
b Equals B ÷ C.
c Read from a smooth curve.
d Derived by means of a special study; see § 2d.
e Bureau of Labor index for middle of year, continued back from 1913 to 1909 by special investigation by this Bureau; see Table 2C.
f Equals C × D.
g *U. S. Census of Electric Railways*, 1917, p. 13.

The fractions which have been estimated as representing the proportions of those normally employed, who are at work, are based upon rather slender evidence. Probably, however, they do not diverge far from the truth. Their derivation is described in Chapter 2.

The results of the computations recorded in Table 12E show a distinct increase in the purchasing power of earnings during the first half of the decade and an equally distinct decline from 1914 to 1918. The conclusion must be that, during the latter period, either the employees grew worse off economically, or else there was a lowering in the grade of labor employed.

§ 12f. Purchasing Power of Share of Security Holders and Property Owners

It seems probable, then, that the employees were not quite as well off in 1918 as in 1909, but how about the investors? Owing to the variations in

the price level, a mere statement of the number of dollars which the latter received throws but little light upon the question. It is essential that the amounts in money be reduced to a basis of purchasing power, if an intelligent answer is to be given. This has been done in Table 12F. The price index used for the correction represents approximately the changes in the value of consumption goods used by the wealthy, since the majority of the stock in most corporations is held by persons having large incomes.

TABLE 12F

THE PURCHASING POWER OF THE BUSINESS SAVINGS AND OF THE DISBURSEMENTS MADE TO THE PROPERTY OWNERS FROM THE NET VALUE PRODUCT OF THE STREET AND ELECTRIC RAILWAY INDUSTRY

(Values in Thousands of Dollars)

Year	Corporate savings			Bond interest, dividends, and rent		
	Actual value [b]	Index of construction costs [a]	Value at prices of 1913 [e]	Actual amount paid [c]	Index of prices of articles used by families spending $25,000 annually [d]	Value at prices of 1913 [e]
1909 . .	$13,940	.927	$15,038	$140,860	.973	$144,769
1910 . .	16,690	.953	17,513	149,410	.988	151,225
1911 . .	16,420	.945	17,376	160,580	.995	161,387
1912 . .	16,663	.983	16,951	172,222	1.000	172,222
1913 . .	10,770	1.000	10,770	181,630	1.000	181,630
1914 . .	13,300	.960	13,852	182,600	1.010	180,792
1915 . .	11,700	.992	11,794	187,400	.996	188,152
1916 . .	10,000	1.194	8,375	192,100	1.074	178,864
1917 . .	8,506	1.473	5,775	196,653	1.198	164,151
1918 . .	—12,100	1.499	—8,067	135,700	1.364	99,487

[a] Data derived from reports of the United States Bureau of Labor Statistics. Weights used: Building labor 3, metals and implements 2, building materials 1.
[b] See Table 12D.
[c] Entire share of propertied classes less corporate savings; see Table 12B.
[d] Derived by a special study; see Table 2E.
[e] Obtained by dividing the money values by the price index.

Table 12F shows how very sharp has been the fall in the purchasing power of the income of the investors in street railways. Much more calculation is necessary to ascertain the decline in the real earnings per dollar invested. However, it seems quite certain that the investment has been all the time increasing rather than diminishing; hence it is evident, that from 1910 to 1918, street railway securities were constantly giving poorer and poorer returns on the investment.

§ 12g. The Average Output per Employee

Another query of interest is whether the output per employee has been increasing or diminishing during the decade under discussion. An increase in output might be due either to greater efficiency in management, better equipment, or greater skill or effort on the part of the employees. At present, only the facts and not the causes will be considered. The best measure of output is believed to be the car mile, which also seems to represent the best criterion of service rendered by the company. Cars have changed only moderately in size during the decade under discussion but there has apparently been some increase in capacity and it is not certain that the number of passengers crowded into a car may not have varied greatly. No record of seat miles is obtainable; hence the car mile is used as the nearest approximation to this ideal measure of service rendered. Table 12G shows roughly the facts both as to service per employee and service rendered per capita for the population of the Continental United States.

TABLE 12G

THE ESTIMATED NUMBER OF REVENUE CAR MILES PER EMPLOYEE AND PER CAPITA FOR THE STREET AND ELECTRIC RAILWAYS OF THE CONTINENTAL UNITED STATES

Year	Revenue car miles (Thousands)	Number of employees actually at work *f*	Revenue car miles per employee	Population of Continental United States *g* (Thousands)	Revenue car miles per inhabitant of the United States
1907.....	1,617,731 *a*	221,429	7,303	87,321 *h*	18.53
1909.....	1,725,000 *b*	251,800	6,851	90,370	19.09
1910.....	1,785,000 *b*	266,100	6,708	92,229	19.35
1911.....	1,845,000 *b*	273,600	6,743	93,811	19.67
1912.....	1,921,620 *a*	282,461	6,803	95,338	20.16
1913.....	2,000,000 *b*	284,100	7,040	97,278	20.56
1914.....	2,068,000 *c*	278,200	7,434	99,194	20.85
1915.....	2,022,000 *c*	276,000	7,326	100,428	20.13
1916.....	2,110,000 *d*	292,300	7,219	101,722	20.74
1917.....	2,139,802 *a*	294,826	7,258	103,059	20.76
1918.....	2,051,356 *e*	292,400	7,013	104,182	19.69

a *Census of Electric Railways*, 1917, pp. 12–13.
b Roughly estimated by aid of a smooth curve.
c Estimated from tables in *Aera*, March, 1917, p. 925.
d Estimated from tables in *Aera*, March, 1918, p. 796.
e Estimated from records of 345 companies; see *Aera*, Aug. 1919, p. 47.
f See Table 12E.
g Figures derived from a special study; see § 2a.
h *Statistical Abstract of the U. S.*, 1918, p. 776.

Table 12G indicates that the output per employee declined noticeably from 1907 to 1910, that, after that date, it varied irregularly, but in most years did not differ greatly from the 1907 rate. Since cars have probably increased somewhat in size it is not unlikely that the passenger miles per employee were greater in number in 1918 than in 1907. As to the effort involved in moving a car a mile, it may be noted that it has been affected by several varying forces. Larger cars require more work in collecting fares but improved devices lessen the physical work of manipulating the machinery. The car mile may then perhaps be a fairly satisfactory gauge of work performed, even though conditions have changed somewhat during the period studied.

§ 12h. Relative Growths of Street Car Service and National Population

The last column of the table shows that up to 1914 street railway service was growing faster than population but that since that date the two rates of growth have been about equal, with an actual decline occurring in 1918 in the car mileage per capita. This change in the amount of service per person in the United States has doubtless been the result of several independent forces acting simultaneously. The chief force tending to send the per capita amount of service upward is the relatively rapid growth of the urban as compared to the rural population. This tends to increase the average street car patronage among the general population, for, as cities grow larger, not only must a larger percentage of their inhabitants ride to work, but also each person who rides must, on the average, travel more miles to reach the business district.

Two forces acting in the opposite direction which have been especially potent in restricting traffic since 1914 are the increase in the automobile-owning percentage of the population and the competition of automobile busses with the street railways. During the period since 1917, the growth of street railway traffic has been further hampered by the fact that extensions could not readily be financed because of low net income arising from fixed rates of fare and higher costs of operation. In 1918, a further restricting factor of some moment was the difficulty of obtaining sufficient employees to keep the service in full operation.

Despite the decline in service occurring at the close of the recorded period, it seems probable that the car mileage per capita may again increase at a rate similar to that prevailing before 1915. The actual increase during the decade in service is probably slightly greater than the figures show, for it is presumably true that the average seating capacity of cars has grown somewhat in the interim.

CHAPTER 13

PRIVATE ELECTRIC LIGHT AND POWER COMPANIES

§ 13a. The Census Data

The Census Bureau secures records from electric light and power companies at five year intervals. Censuses were taken in 1907, 1912, and 1917.[1] This spacing of time is such that estimates for each year of the period under consideration can be made with a reasonable degree of accuracy. The Census data, of course, were not collected with a view to answering the questions brought forward in our particular inquiry and hence are not entirely adapted to our needs. It is believed, however, that the official figures afford a basis for estimates that serve the present purpose fairly well.

The methods of interpolation used, of course, give only approximations; but, owing to the advantageous location of the Census dates, it is not likely that they have given rise to errors of any moment.

There are doubtless certain inaccuracies in the amounts recorded for the Census years themselves. For example, some rent and some interest on short time loans are doubtless paid to individuals, and employees receive some recompense for injuries. Presumably, however, all of these amounts are quite small. On the whole, it is believed that the figures shown in the study approximate the facts rather closely.

The way in which the Census figures have been used is shown in Table 13A.

Certain explanations are necessary concerning the nature of some of the items in Table 13A. For the reasons stated in Section 9b, income received as interest or dividends from other companies is not included in the value product of this industry. The income from operations less expenses should give the gain which is to be distributed among the owners of the plants. Interest paid to bondholders is included among "Expenses." To arrive at the gains of all investors, this item should be added to the dividends paid from operating receipts.

The Census records small payments for damages and legal expenses. Evidently, money paid for lands flooded or property destroyed represents

[1] Professor Edmond E. Lincoln of Harvard University, who has been in charge of this part of the Census, has kindly criticised the results here presented. While he cannot be held responsible for the estimates given, his suggestions were most helpful and the report has been materially improved by their incorporation.

TABLE 13A

THE CENSUS FIGURES FOR THE ITEMS COMPOSING THE NET VALUE PRODUCT OF PRIVATE ELECTRIC LIGHT AND POWER PLANTS IN THE CONTINENTAL UNITED STATES

Item	Millions of dollars		
	Census of		
	1907	1912	1917
Gross Income from Operation	$159.7 [a]	$274.0 [b]	$477.8 [c]
Total Expenses [d]	123.0 [e]	216.0 [f]	391.0 [g]
Net Profits from Operation	$ 36.7	$ 58.0	$ 86.8 [n]
Payments to Employees: [i]			
Wages	$21.2 [h]	$33.0 [h]	$52.0 [h]
Salaries	10.7 [h]	22.6 [h]	34.4 [h]
Total	$31.9	$55.6	$86.4
Payments to Investors: [j]			
Net Profits from Operation	$36.7	$58.0	$86.9
Interest on Funded Debt	26.8 [k]	40.5 [l]	61.0 [m]
Total	$63.5	$98.5	$147.9
Total Value Product of Industry	$95.4	$154.1	$234.3
Per cent of Value Product Received by Employees	33.4	36.1	36.9

[a] *U. S. Census of Central Electric Light and Power Stations*, 1907, p. 159. In 1912 33.4 per cent of "All Other Income" was from investments. The same percentage (or $1,880,000), has been deducted in 1907.

[b] *U. S. Census of Central Elec. Light and Power Stations*, 1912, p. 89.

[c] *U. S. Census of Central Elec. Light and Power Stations*, 1917, p. 155; interest and dividends from investments excluded.

[d] Excludes sinking and reserve funds.

[e] In 1912, sinking and reserve funds constituted 1.69 per cent of miscellaneous expenses, hence 1.69 per cent of the 1907 miscellaneous expenses, or $834,000 have been deducted.

[f] *U. S. Census of Central Elec. Light and Power Stations*, 1912, p. 95.

[g] *U. S. Census of Central Elec. Light and Power Stations*, 1917, pp. 160–161.

[h] *U. S. Census of Central Elec. Light and Power Stations*, 1917, p. 120.

[i] There should be included here any amounts paid to employees as compensation for injuries. Professor Edmond E. Lincoln, special statistician for the Census Bureau in this line, assures us that this amount is less than $100,000; hence no entry has been made.

[j] No item is entered under this head for rents because Professor Lincoln states that the amount of rent going to individuals is "wholly negligible" practically all being paid "for stations, equipment of various kinds, use of lines and conduits, water privilege, etc."

[k] *United States Census of Elec. Light and Power Stations*, 1907, p. 61.

[l] 4.5% on funded debt, the rate being estimated from the *U. S. Census of Central Electric Light and Power Stations* for 1917, pp. 103 and 115.

[m] 4.7% on funded debt, the rate being estimated from the references cited under "l."

[n] Fraction over ½.

no net gain and therefore adds nothing to private revenues. Some damages doubtless are paid to injured employees, but the amount is stated by authority to be negligible.

By the process just described, it is believed that, for the Census years, the respective shares of the value product of the industry going to the persons working for hire and to the persons who take the risk and expect to secure remuneration for the investment of their efforts or property from the residuum of the net receipts have been fairly well differentiated. If the share of the employees is divided by the total value product of the industry and the quotient is multiplied by 100, the resulting product represents the approximate percentage of the value product going to the employees,—a group that, by contract, holds the primary claim against the net product of the enterprise.

§ 13b. The Net Value Product and Its Distribution

Table 13A completes the inquiry for the Census years, but, under the plan of campaign determined upon, it is necessary to estimate the value product and its distribution for each year from 1909 to 1918. Some basis of interpolation is therefore essential. The criteria depended upon for this purpose are derived from the annual reports of 19 typical electric light and power companies as quoted in Moody's *Manual*. The respective totals of net earnings, operating expenses, interest on funded debt, dividends, and corporate surplus have been calculated for each year from 1907 to 1918 for the entire group of corporations and are recorded in Tables 13B and 13C.

It is assumed that the ratio of profits of all concerns to the net earnings of the 19 typical corporations is a relatively stable quantity and that its changes can therefore, be well depicted by a smooth curve determined by the ratios for 1907, 1912 and 1917. Similarly it is assumed that the respective ratios of salaries and wages paid by all plants to the total operating expenses of the 19 selected corporations are relatively fixed, varying along a smooth curve rather than oscillating violently, and that the same holds true of the ratio of bond interest paid by all concerns to the interest on the funded debt reported by the sample corporations. The treatment of the data according to these assumptions yields the results set forth in Tables 13B, 13C, and 13D.

TABLE 13B

AN ESTIMATE OF THE TOTAL NET PROFITS OF PRIVATE ELECTRIC LIGHT AND POWER PLANTS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Year	Total net earnings of 19 typical electric companies [a] (Thousands)	Total net profit of all private plants as shown by Census [d] (Thousands)	Ratio of total net profits to net earnings of typical companies	Estimated [d] net profit of all private plants B × D (Thousands)
1907.....	$15,652	$36,704	2.345 [b]	$36,704
1909.....	18,438		2.310 [c]	42,600
1910.....	21,422		2.303 [c]	49,330
1911.....	23,023		2.300 [c]	52,950
1912.....	25,293	58,046	2.295 [b]	58,046
1913.....	26,884		2.322 [c]	62,420
1914.....	27,747		2.362 [c]	65,550
1915.....	31,154		2.420 [c]	75,400
1916.....	34,585		2.489 [c]	86,100
1917.....	33,798	86,857	2.570 [b]	86,857
1918.....	33,898		2.655 [c]	90,000

[a] Compiled from various numbers of Moody's *Manual of Corporation Securities.*
[b] Computed by division.
[c] Interpolated along a smooth curve.
[d] For references, see Table 13A.

TABLE 13C

AN ESTIMATE OF SALARIES AND WAGES PAID BY PRIVATE ELECTRIC LIGHT AND POWER COMPANIES IN THE INTERCENSAL YEARS

Year	Total operating expenses of 19 typical electric companies [a] (Thousands)	Salaries paid by all plants (Census figures [d]) (Thousands)	Ratio of salaries paid by all plants to expenses of typical companies	Estimated total salaries paid by all plants [e] (Thousands)	Wages paid by all plants (Census figures [d]) (Thousands)	Ratio of wages paid by all plants to expenses of typical companies	Estimated total wages paid by all plants [e] (Thousands)
1907...	$23,571	$10,739	.456 [b]	$10,739 [d]	$21,196	.899 [b]	$21,196 [d]
1909...	27,740		.541 [c]	15,000		.896 [c]	24,850
1910...	31,734		.574 [c]	18,220		.892 [c]	28,300
1911...	33,571		.596 [c]	20,000		.888 [c]	29,800
1912...	37,338	22,637	.606 [b]	22,637 [d]	33,021	.884 [b]	33,021 [d]
1913...	39,804		.602 [c]	23,980		.878 [c]	34,940
1914...	42,458		.593 [c]	25,190		.867 [c]	36,800
1915...	44,078		.582 [c]	25,660		.858 [c]	37,800
1916...	50,615		.562 [c]	28,460		.842 [c]	42,600
1917...	62,825	34,439	.548 [b]	34,439 [d]	52,035	.823 [b]	52,035 [d]
1918...	72,220		.525 [c]	37,970		.811 [c]	58,550

[a] Compiled from various numbers of Moody's *Manual of Corporation Securities*.
[b] Computed.
[c] Interpolated along a smooth curve.
[d] See Table 13A for references.
[e] Operating expenses of typical companies multiplied by the appropriate ratio.

TABLE 13D

AN ESTIMATE OF THE PAYMENTS OF BOND INTEREST MADE BY PRIVATE ELECTRIC LIGHT AND POWER COMPANIES IN THE INTERCENSAL YEARS

A	B	C	D	E
Year	Index of interest on funded debt paid by 15 reporting corporations [a]	Bond interest paid by all plants. (Census figures [b]) (Thousands)	Ratio of C to B	Estimated bond interest paid by all plants (Thousands) B × D
1907	20,692	$26,842	1.297 [c]	$26,842
1909	20,038		1.432 [d]	28,705
1910	22,096		1.503 [d]	33,218
1911	23,965		1.575 [d]	37,757
1912	24,520	40,450	1.650 [c]	40,450
1913	25,415		1.724 [d]	43,816
1914	24,675		1.800 [d]	44,415
1915	27,055		1.880 [d]	50,861
1916	29,350		1.957 [d]	57,453
1917	30,000	61,000	2.033 [c]	61,000
1918	33,382		2.108 [d]	70,368

[a] Compiled from various numbers of Poor's and Moody's *Manual of Public Utilities.*
[b] For references, see Table 13A.
[c] Computed by division.
[d] Read from a smooth curve.

It is of interest to note the fact that the industry shows an unusually steady increase in all lines throughout the decade. Profits, wages, and bond interest have each nearly trebled. No violent fluctuation appeared anywhere.

The next step in the usual procedure followed in these studies is to divide the total share of entrepreneurs and property owners into two parts; namely, disbursements, and business savings. This apportionment has been based upon the proportionate division of the net gain of the previously mentioned reporting corporations between dividends and corporate savings.

The corporations were separated into three classes based upon size. Ratios were separately computed from the totals of each class and the arithmetic average of these three ratios is the quantity here presented. This method prevents the domination of the results by the large corporations which probably form a much larger proportion of the sample than of the industry as a whole.

TABLE 13E

AN ESTIMATE OF THE TOTAL DISBURSEMENTS MADE TO THE STOCK AND BOND HOLDERS BY PRIVATE ELECTRIC LIGHT AND POWER PLANTS

A	B	C	D	E	F	G
Calendar year	Net profits of all companies [a] (Thousands)	Fraction of net profits saved by sample corporations	Savings of all concerns (Thousands) C × B	Dividends of all concerns (Thousands) B — D	Bond interest paid by all concerns [b] (Thousands)	Total disbursements to stock and bond holders (Thousands) E + F
1907.....	$36,704	.5346	$19,622	$17,082	$26,842	$43,924
1909.....	42,600	.3072	13,087	29,513	28,705	58,218
1910.....	49,330	.3634	17,925	31,405	33,218	64,623
1911.....	52,950	.3251	17,215	35,735	37,757	73,492
1912.....	58,046	.2974	17,263	40,783	40,450	81,233
1913.....	62,420	.3208	20,024	42,396	43,816	86,212
1914.....	65,550	.1939	12,710	52,840	44,415	97,255
1915.....	75,400	.3064	23,104	52,296	50,861	103,157
1916.....	86,100	.3691	31,784	54,316	57,453	111,769
1917.....	86,857	.2888	25,088	61,769	61,000	122,769
1918.....	90,000	.2253	20,282	69,718	70,368	140,086

[a] See last column of Table 13B.
[b] See Table 13D, Column E.

It is now in order to measure the purchasing power of that share of the total value product of the industry which was paid to the stock and bond holders. This is done in Table 13F.

TABLE 13F

THE PURCHASING POWER OF THE SHARE OF THE STOCK AND BOND HOLDERS IN THE VALUE PRODUCT OF PRIVATE ELECTRIC LIGHT AND POWER PLANTS

A	B	C	D	E	F	G
	Corporate savings			Interest and dividends paid		
Calendar year	Thousands of dollars [a]	Index of construction costs [b]	Value at prices of 1913 (Thousands) B/C	Thousands of dollars [c]	Index of prices of goods used by the wealthier classes [d]	Value at prices of 1913 (Thousands) E/F
1909....	$13,087	.927	$14,118	$58,218	.965	$60,330
1910....	17,925	.953	18,809	64,623	.983	65,741
1911....	17,215	.945	18,217	73,492	.990	74,234
1912....	17,263	.983	17,562	81,233	1.000	81,233
1913....	20,024	1.000	20,024	86,212	1.000	86,212
1914....	12,710	1.013	12,547	97,255	1.011	96,197
1915....	23,104	1.002	23,058	103,157	0.999	103,260
1916....	31,784	1.088	29,213	111,769	1.081	103,394
1917....	25,088	1.252	20,038	122,769	1.225	100,220
1918....	20,282	1.448	14,007	140,086	1.406	99,634

[a] See Table 13E, Column D.
[b] Indices derived from Bureau of Labor Statistics combined, with weights assigned as follows: Building labor 3, Metals and metal products 2, Building materials 1.
[c] See Table 13E, Column G.
[d] An average of the indices for those classes spending respectively $5,000 and $25,000 annually for consumption goods. See § 2c.

Table 13F indicates that when price variations are eliminated corporate savings show little difference at the beginning and end of the decade; but that the disbursements to investors rose sharply during the first half of the period and then became nearly stationary, presumably because of the prevalence of relatively fixed rates in the face of rising costs of operation.

Table 13G is devoted to showing the fraction of the net value product going to the employees.

TABLE 13G

THE ESTIMATED TOTAL VALUE PRODUCT OF PRIVATE ELECTRIC LIGHT AND POWER PLANTS AND ITS DISTRIBUTION

(Continental United States, 1909–1918)

(Values all in thousands of dollars)

Year	Share of stock and bond holders			Share of employees. Salaries and wages [c]	Total value product of industry [d]	Per cent of value product going to employees
	Retained in business [a] (Savings)	Amounts withdrawn from business [b]	Total			
1907.....	$19,622	$43,924	$63,546	$31,935	$95,431	33.5
1909.....	13,087	58,218	71,305	39,850	111,155	35.8
1910.....	17,925	64,623	82,548	46,520	129,068	36.0
1911.....	17,215	73,492	90,707	49,800	140,507	35.4
1912.....	17,263	81,233	98,496	55,658	154,154	36.1
1913.....	20,024	86,212	106,236	58,920	165,156	35.7
1914.....	12,710	97,255	109,965	61,990	171,955	36.0
1915.....	23,104	103,157	126,261	63,460	189,721	33.4
1916.....	31,784	111,769	143,553	71,060	214,613	33.1
1917.....	25,088	122,769	147,857	86,474	234,331	36.9
1918.....	20,282	140,086	160,368	96,520	256,888	37.6

[a] See Table 13E, Column D.
[b] See Table 13E, Column G.
[c] Derived from Table 13C by combining wages and salaries.
[d] Sum of two preceding columns.

It is clear that the employees receive a smaller share of the value product in this industry than in most other fields. This may be due to the large amount of investment per employee, the small amount of labor required per unit of output, or perhaps to some other reason. That it is not primarily the result of paying much lower average wages than other industries is indicated by the entries in Table 13H.

TABLE 13H

AN ESTIMATE OF THE AVERAGE ANNUAL EARNINGS OF EMPLOYEES OF PRIVATE ELECTRIC LIGHT AND POWER COMPANIES

A	B	C	D	E	F	G	H
Calendar year	Average number of employees actually at work	Fraction of those attached to industry actually working	Number attached to industry $\frac{B}{C}$	Total wages and salaries paid [e] (Thousands)	Average annual earnings per employee [e] attached to industry $\frac{E}{D}$	Index of prices of goods consumed by manual and clerical workers [f]	Annual average earnings at prices of 1913 $\frac{F}{G}$
1907	42,066 [a]	.96 [b]	43,920 [c]	$31,935	$727		
1909			55,000 [d]	39,850	725	.955	$759
1910			60,500 [d]	46,520	769	.978	786
1911			67,000 [d]	49,800	743	.984	755
1912	71,395 [a]	.98 [b]	72,830 [c]	55,658	764	.994	769
1913			78,500 [d]	58,920	751	1.000	751
1914			84,100 [d]	61,990	737	1.01	730
1915			89,000 [d]	63,460	713	1.03	692
1916			94,000 [d]	71,060	756	1.10	687
1917	94,679 [a]	.97 [b]	97,700 [c]	86,474	885	1.29	686
1918			101,500 [d]	96,520	951	1.58	602

[a] *U. S. Census of Electric Light and Power Stations*, p. 120.
[b] Roughly estimated.
[c] Computed by division.
[d] Interpolated along a smooth curve.
[e] See Table 13G.
[f] Bureau of Labor Statistics index carried back by means of a special study; see Table 2C.

It is evident that the purchasing power of the average earnings has failed to keep pace with the rising price level. Whether this is due to the substitution of a poorer grade of employees or a failure to raise wage rates in proportion to the increase in the price level is not indicated by the data at hand.

It seems impracticable to measure with any degree of accuracy the output per employee or per capita for other periods than the Census years. Those years are so spaced, however, that a comparison based thereon answers many of the essential queries. The data appear in Table 13I.

TABLE 131

NUMBER OF KILOWATT HOURS PROD[illegible] CAPITA BY PRIVATE ELECTRIC LIGHT [illegible]

A	B	C	D
Census year	Kilowatt hours generated[a] (Millions)	Average number of employees [illegible]	[illegible]
1907	5,573	[illegible]	[illegible]
1912	11,032	[illegible]	[illegible]
1917	24,[illegible]	[illegible]	[illegible]

[a] *U. S. Census of Central Electric Light* [illegible]
[b] Estimated by means of a [illegible]
[c] Census estimate [illegible]

A glance at the table [illegible] rent generated for each [illegible] country. Whether [illegible] is due to greater [illegible] determined by [illegible] produced by [illegible] meeting the power [illegible]

CHAPTER 14

TELEGRAPHS [1]

§ 14a. The Census Figures

The Telegraph industry was covered by the Census in 1907, 1912, and 1917, years admirably located so far as the period 1909 to 1918 is concerned and the figures are in a form so well adapted to the needs of this investigation that estimates for the Census years may be made with reasonable accuracy. The Census presents the figures for wireless telegraphs in a category separate from that dealing with land telegraphs and ocean cables, but all have been combined in the study here presented. Table 14A covers the Census data.

§ 14b. Disbursements to Stock and Bond Holders

The entries in Table 14A are presumably fairly close to the truth. The next problem is to interpolate estimates for the intercensal years. Most of the telegraph industry is in the hands of the Western Union and the Mackay Companies; hence it would seem an exceedingly simple matter to use their records for the purpose mentioned. As a matter of fact, accurate interpolation by this method is impossible. Some of the obstacles are as follows:

1. The Mackay Company is a holding company and it does not present a consolidated account or reports for most of its subsidiaries.

2. Much of the recorded business of both companies has apparently been excluded from the Census, the reason for the exclusion not being ascertainable, but presumably duplication in accounts has been discovered.

3. The accounts of the Mackay subsidiaries are not presented in sufficient detail to answer our purposes.

4. The fiscal years of the corporations do not correspond with the calendar years.

The net result is that the corporation reports and Census figures for the same years show no resemblance to each other. It has, however, been felt that the use of the corporation statistics, unsatisfactory as they are, will give slightly better results than would direct interpolations along smooth curves—hence the usual procedure has been followed, the criteria chosen being indicated in the tables. The reader is warned, however, against

[1] Mr. William A. Countryman of the Census Bureau has been kind enough to read over this report and offer valuable suggestions, most of which have been adopted.

TABLE 14A

THE ESTIMATED VALUE PRODUCT IN THE CENSUS YEARS OF THE TELEGRAPH INDUSTRY IN THE CONTINENTAL UNITED STATES

Year	1907	1912	1917
Dividend Payments.[a] (Thousands)	$ 7,477	$ 6,180	$ 9,928
Interest Paid on Funded Debt.[b] (Thousands)	2,653	2,769	2,584
Total Payments for Interest and Dividends (Thousands)	$10,130	$ 8,949	$12,512
Receipts of Interest and Dividends from Other Corporations.[c] (Thousands)	1,415	780	2,547
Interest and Dividend Payments Originating in the Telegraph Industry. (Thousands)	$ 8,715	$ 8,169	$ 9,965
Rent of Offices and Real Estate.[d] (Thousands)	1,221	1,686	2,498
Total Disbursements to Property Owners. (Thousands)	$ 9,936	$ 9,855	$12,463
Savings[e] of All Companies.[a] (Thousands)	2,173	209	8,625
Total Share of Property. (Thousands)	$12,109	$10,064	$21,088
Wages and Salaries Paid.[f] (Thousands)	$17,890	$25,609	$40,105
Estimated Other Compensation to Employees.[g] (Thousands)	10[h]	50[h]	330[i]
Total Share of Employees. (Thousands)	$17,900	$25,659	$40,435
Average Number of Employees Actually at Work	28,210	38,253	52,160
Average Full-time Annual Compensation per Employee	$635	$671	$775
SUMMARY.			
Total Share of Property. (Thousands)	$12,109	$10,064	$21,088
Total Share of Employees. (Thousands)	17,900	25,659	40,435
Total Value Product of Industry. (Thousands)	$30,009	$35,723	$61,523
Per Cent of Value Product Going to Employees	59.6	71.8	65.6

T. = United States Census of Telegraphs.

[a] T. 1917, pp. 16, 23, and 25.

[b] T. 1917, pp. 16, 23, and 25; a study of the income statements of the Western Union and Mackay Companies shows that practically the entire amount recorded by the Census as "Interest" must be bond interest. The items here given fail to include the mortgage interest paid by the wireless companies. The exact amounts are unknown but they are too small to be of moment.

[c] T. 1917, pp. 16, and 25. The consolidated balance sheet shows such large holdings of securities that apparently the Census item "Income from other sources" must consist primarily of bond interest and dividends; see T. 1917, pp. 22–23. This item is not reported for wireless companies; hence it is assumed to be negligible and is omitted from consideration.

[d] T. 1917, pp. 17 and 23. A small item was added in each year for estimated rent paid by wireless stations. The estimates were 60, 55, and 63 thousands of dollars for the respective Census years beginning with 1907. The estimates were based on assumed annual rents per station of $500 in 1907, $750 in 1912, and $1,000 in 1917. The final estimate of total gross rents was multiplied by 0.7 in order to obtain a figure for net rents, the 0.3 being allowed for repairs, depreciation, etc.

[e] Commonly called "Corporate surplus."

[f] T. 1917, pp. 14, 22, and 25.

TABLE 14A NOTES—*Continued*

g Pensions, compensation for injuries, etc.

h Pure guesses.

i An organized system of benefits was initiated by the Western Union Co. in 1916; for amount, see Standard Corporation Record card for 1920, No. W1.

attaching too great importance to apparent fluctuations from year to year as, in some instances, such variations in the figures are doubtless due wholly to purely accidental errors. Were it not that the data are all tied

TABLE 14B

THE ESTIMATED GROSS DISBURSEMENTS IN THE FORM OF DIVIDENDS AND INTEREST ON THE FUNDED DEBT MADE BY ALL TELEGRAPH CORPORATIONS IN THE CONTINENTAL UNITED STATES

	Dividend payments in thousands of dollars				Interest payments in thousands of dollars				
A	B	C	D	E	F	G	H	I	Dividends plus interest (Thousands of dollars) E + I
Calendar year	Census figures, all companies[a]	Combined dividends of Western Union and Mackay Cos.[b a]	Ratio of B to C	Estimated dividends of all companies D × C	Census figures, all companies[a]	Interest paid by Western Union and the Commercial Cable Cos.[b a]	Ratio of F to G	Estimated interest on funded debt of all companies G × H	
1907	7,477	6,947	1.076[d]	7,477[a]	2,653	9,576	.2770[d]	2,653[a]	10,130
1909		6,623	.933[e]	6,180		9,710	.2861[e]	2,778	8,958
1910		7,059	.894[e]	6,310		9,711	.2887[e]	2,804	9,114
1911		7,060	.884[e]	6,240		9,700	.2901[e]	2,814	9,054
1912	6,180	7,061	.875[d]	6,180[a]	2,769	9,503	.2914[d]	2,769[a]	8,949
1913		7,061	.872[e]	6,160		9,337	.2900[e]	2,708	8,868
1914		8,058	.872[e]	7,026		9,337	.2870[e]	2,680	9,706
1915		9,055	.871[e]	7,887		9,336	.2823[e]	2,636	10,523
1916		10,054	.870[e]	8,747		9,332	.2775[e]	2,590	11,337
1917	9,928	11,407	.870[d]	9,928[a]	2,584	9,332	.2769[d]	2,584[a]	12,512
1918		11,371	.868[e]	9,865		9,332	.2760[e]	2,576	12,441
1919		11,338	.867[e]	9,835		9,332	.2754[e]	2,570	12,405

[a] See Table 14A. The Census apparently excludes interest charges on bonds secured by foreign cable lines and dividends paid to foreign investors.

[b] Figures for fiscal years 1907 to 1912 inclusive adjusted to calendar years by averaging. Data from Poor's and Moody's *Manuals of Public Utilities*.

[c] The Commercial Cable Co. is a subsidiary of the Mackay Cos.

[d] Computed.

[e] Read from a smooth curve.

to the Census at five year intervals, the whole study might well be regarded as practically worthless. As it is, it cannot well go far astray in the relatively brief spaces of time intervening between Census years.

Not all of the payments to stock and bond holders are made from income

total net payments going to individuals who have property claims against the industry. Rents have been assumed to vary roughly in proportion to the gross revenues of the Western Union Company, the theory being that more business requires more office space and that gross revenues measure

TABLE 14D

THE ESTIMATED TOTAL DISBURSEMENTS TO ENTREPRENEURS AND OTHER PROPERTY OWNERS MADE BY THE TELEGRAPH INDUSTRY OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G
Calendar year	Rent of offices and real estate in Census years [a] (Thousands)	Gross earnings of Western Union Company [b] (Thousands)	Ratio of B to C	Estimated rent paid for offices (Thousands) C × D	Net payments of dividends and interest on funded debt [g] (Thousands)	Total disbursements to entrepreneurs and other property owners (Thousands) E + F
1907..	$1,221	$30,719	.0397 [d]	$1,221 [f]	$8,715	$ 9,936
1909..		31,647	.0393 [e]	1,244	7,647	8,891
1910..		34,116	.0390 [e]	1,331	8,059	9,390
1911..		38,570	.0387 [e]	1,493	8,003	9,496
1912..	1,686	44,024	.0383 [d]	1,686 [f]	8,169	9,855
1913..		45,784	.0374 [e]	1,712	8,053	9,765
1914..		46,265	.0360 [e]	1,666	8,754	10,420
1915..		51,172	.0345 [e]	1,765	8,826	10,591
1916..		61,919	.0334 [e]	2,068	8,612	10,680
1917..	2,498	76,996	.0324 [d]	2,498 [f]	9,965	12,463
1918..		86,702 [h]	.0319 [e]	2,766	9,931	12,697
1919..		103,756 [c]	.0315 [e]	3,268	9,412	12,680

[a] See Table 14A.
[b] Amounts for fiscal years 1907–1912 averaged to obtain estimates for calendar years. Data derived from Poor's and Moody's *Manuals of Public Utilities.*
[c] Data from card issued Jan. 17, 1921, by Standard Corporation Service.
[d] Computed.
[e] Read from smooth curve.
[f] Census figures—see Table 14A.
[g] See Table 14C.
[h] Other income of $1,391,128 subtracted from gross income as reported in *Statistical Abstract of U. S.* for 1919, p. 321. "Other Income" reported in Moody's *Manual of Public Utilities* for 1920, p. 1161.

the value of business done. It has also been assumed that 30 per cent of the gross rent is necessary to cover expenses of operating the buildings and allowances for depreciation, leaving only 70 per cent as net income from the investment in the buildings and land. The final estimates appear in Table 14D.

§ 14c. Corporate Savings

The estimates presented in the preceding tables, while probably inaccurate, nevertheless presumably approach the truth. No estimate is, however, complete if the corporate savings are left out. It may be true that these companies have saved much in addition to their normal surplus by charging improvements to operating expenses. Whether this possi-

TABLE 14E

THE ESTIMATED TOTAL SHARE OF THE ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE VALUE PRODUCT OF TELEGRAPH COMPANIES IN THE CONTINENTAL UNITED STATES, A CRUDE APPROXIMATION TO THE CORPORATE SAVINGS OF THESE COMPANIES BEING INCLUDED

Calendar year	Amounts in Thousands of Dollars				
	Corporate savings, as reported by the Census [a]	Reported surplus of Marconi, Mackay, and Western Union Companies [b]	Estimated corporate savings of all companies	Total disbursements of interest on funded debt, dividends and rent [e]	Total disbursements to propertied classes and corporate surplus (Sum of two preceding columns)
1907	$2,173	$ 111	$2,173 [c]	$ 9,936	$12,109
1909		2,758	5,000 [d]	8,891	13,891
1910		2,507	4,200 [d]	9,390	13,590
1911		1,728	2,500 [d]	9,496	11,996
1912	209	820	209 [c]	9,855	10,064
1913		540	300 [d]	9,765	10,065
1914		649	1,000 [d]	10,420	11,420
1915		5,508	7,000 [d]	10,591	17,591
1916		6,228	8,100 [d]	10,680	18,780
1917	8,625	7,383 [f]	8,625 [c]	12,463	21,088
1918		4,637 [f]	5,410 [d]	12,697	18,107
1919		6,101 [f]	7,130 [d]	12,680	19,810

[a] See Table 14A.
[b] Compiled from the annual reports represented in Poor's and Moody's *Manuals of Public Utilities*. Amounts for fiscal years adjusted by averaging to obtain estimates for the calendar years.
[c] Census figures—see Table 14A.
[d] Crudely estimated by aid of a smooth curve.
[e] See Table 14D.
[f] Surplus of Western Union Co. only.

bility has been duly considered and guarded against in compiling the Census reports, is not known. It is certain, however, that the published corporation reports of surplus show no resemblance to the ones given by the Census. It has proved impossible, therefore, to interpolate the estimates

for the surplus according to the usual rules. The best that can be done with the data at hand is to adjust the figures roughly so that the principal fluctuations shown by the corporation reports are given consideration. These crude results appear in Table 14E.

§ 14d. Purchasing Power of Share of Property Owners and Entrepreneurs

The purchasing power of the income received by property owners is arrived at by dividing the number of dollars by an index of the average

TABLE 14F

THE PURCHASING POWER OF THAT PART OF THE INCOME DERIVED FROM THE TELEGRAPH INDUSTRY OF THE CONTINENTAL UNITED STATES DISBURSED TO ENTREPRENEURS AND OTHER PROPERTY OWNERS OR SAVED BY THE CORPORATIONS

(Amounts in Thousands of Dollars)

A	B	C	D	E	F	G
Calendar year	Disbursements to entrepreneurs and other property owners [a]	Index of prices of goods consumed by wealthy classes [c]	Purchasing power at prices of 1913 B ÷ C	Corporate savings [b]	Index of construction costs [d]	Constructive power of corporate savings at prices of 1913 E ÷ F
1907 ...	$ 9,936			$2,173	1.023	$2,124
1909 ...	8,891	.973	$ 9,138	5,000	.881	5,675
1910 ...	9,390	.988	9,504	4,200	.903	4,651
1911 ...	9,496	.995	9,544	2,500	.903	2,769
1912 ...	9,855	1.000	9,855	209	.982	213
1913 ...	9,765	1.000	9,765	300	1.000	300
1914 ...	10,420	1.010	10,317	1,000	.968	1,033
1915 ...	10,591	.996	10,634	7,000	1.059	6,610
1916 ...	10,680	1.074	9,944	8,100	1.336	6,063
1917 ...	12,463	1.198	10,403	8,625	1.495	5,769
1918 ...	12,697	1.364	9,309	5,410	1.525	3,548
1919 ...	12,680	1.628	7,789	7,130	1.607	4,437

[a] See Table 14D; includes interest, dividends, and rents.
[b] See Table 14E.
[c] See Table 2E; represents families spending on the average, $25,000 per annum.
[d] Worked out by the statistical department of the American Telephone and Telegraph Co.

prices of commodities consumed by the well-to-do classes. This operation has been carried out and the results appear in Table 14F.

A glance at Table 14F makes it evident that the lean period for the owners of the telegraph industry was in 1912 and 1913. This was followed by a period of prosperity; although, in 1918, the share of the property owners again declined slightly, only to recover again in 1919.

§ 14e. The Number of Employees and Their Share in the Value Product

The corporate reports of the telegraph companies do not show either the number of employees or the amounts paid in wages. They do not even tell how many messages have been sent. It is, therefore, impossible to interpolate these quantities between the years in which we have Census data

TABLE 14G

THE ESTIMATED SHARE OF THE EMPLOYEES IN THE VALUE PRODUCT OF THE TELEGRAPH INDUSTRY OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G
Calendar year	Wages and salaries paid in Census years [a] (Thousands)	Total operating expenses of the Western Union Co.[b] (Thousands)	Ratio of B to C	Estimated total wages and salaries (Thousands) C × D	Estimated benefits paid to employees[f] (Thousands)	Total compensation of employees (Thousands) E + F
1907.....	$17,890	$18,641	.960 [c]	$17,890 [e]	$ 10	$17,900
1909.....		24,904	.706 [d]	17,580	20	17,600
1910		28,334	.673 [d]	19,070	30	19,100
1911.....		33,063	.657 [d]	21,710	40	21,750
1912.....	25,609	39,521	.648 [c]	25,609 [e]	50	25,659
1913.....		42,327	.647 [d]	27,390	60	27,450
1914.....		40,579	.645 [d]	26,200	70	26,270
1915.....		40,973	.643 [d]	26,320	80	26,400
1916.....		48,728	.642 [d]	31,260	330	31,590
1917.....	40,105	62,783	.639 [c]	40,105 [e]	330	40,435
1918.....		76,713	.639 [d]	49,000	330	49,330
1919.....		78,646	.638 [d]	50,160	330	50,490

[a] See Table 14A.

[b] Figures for fiscal years 1907 to 1912 averaged to obtain estimates for calendar years; for data see Poor's and Moody's *Manuals of Public Utilities*.

[c] Computed.

[d] Read from a smooth curve.

[e] Census figures—see Table 14A.

[f] The Western Union Co. established a system of benefits in 1918. See Cards W1 and 2, of Standard Corporation Record Service. Before that date, payments were probably rather insignificant. The amounts entered for years previous to 1916 are pure guesses.

with any degree of precision. Since, however, an estimate must be made, recourse has been had to the assumptions that the wages are proportional to total operating expenses and that the number of employees varies in proportion to a combination of the total volume of business done and the number of offices operated. This index is chosen because it is evident that the number of offices is a matter of fundamental moment in the ope-

nection, and it seems reasonable to suppose that, in times of flush business, the companies would find it imperative to increase somewhat the average number of employees per office. The fact that the index maintains a fairly constant ratio to the Census figures seems to show that it has some merit. The attempt is made to measure the volume of business by dividing the gross revenues by an index representing the price of messages. No record has been found showing any changes in the rates for messages until March 31, 1919; hence, during the period 1909 to 1918, this price index has been assumed to be constant.

The application of these assumptions appears in Tables 14G and 14H.

TABLE 14H

THE ESTIMATED TOTAL ANNUAL VALUE PRODUCT OF THE TELEGRAPH INDUSTRY OF THE CONTINENTAL UNITED STATES AND THE PRIMARY DIVISION OF THIS PRODUCT

Calendar year	Values in thousands of dollars			Per cent of value product going to employees
	Total value product	Total compensation of employees [a]	Disbursements to property owners and corporate surplus [b]	
1907.....	$30,009	$17,900	$12,109	59.6
1909.....	31,491	17,600	13,891	55.9
1910.....	32,690	19,100	13,590	58.4
1911.....	33,746	21,750	11,996	64.5
1912.....	35,723	25,659	10,064	71.8
1913.....	37,515	27,450	10,065	73.2
1914.....	37,690	26,270	11,420	69.7
1915.....	43,991	26,400	17,591	60.0
1916.....	50,370	31,590	18,780	62.7
1917.....	61,523	40,435	21,088	65.7
1918.....	67,437	49,330	18,107	73.1
1919.....	70,300	50,490	19,810	71.8

[a] See Table 14G, Column G.
[b] See Table 14E, last column.

The compilation of Table 14G makes it possible to ascertain what fraction of the total value product of the telegraph industry goes to compensate the employees for their efforts. The facts in this connection appear in Table 14H.

The general conclusion must be that, while the percentages have fluctuated violently, the employees since 1911, have tended to receive a greater and the property owners, a lesser share of the total value product than was the case during the period 1907 to 1911.

§ 14f. Average Annual Earnings of Employees

Tables 14I and 14J throw light on the changes that have occurred in the size of the average reward of employees in the telegraph industry.

TABLE 14I

THE ESTIMATED NUMBER OF PERSONS AT WORK FOR OR NORMALLY EMPLOYED BY THE TELEGRAPH COMPANIES OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I	J	K
Calendar year	Average number employed in Census years [a]	Gross operating revenues of Western Union Company [b] (Thousands)	Index of telegraph rates [c]	Index of physical volume of business $\frac{C}{D}$	Twice the number of Western Union Telegraph offices [f]	Adjustment index for number of employees E + F	Ratio of B to G	Estimated number of employees actually at work G × H	Fraction of number attached to industry who were actually working [g]	Estimated number of employees attached to industry I ÷ J
1907	28,210	$30,719	1.00	30,719	48,613	79,332	.3556 [c]	28,210	.976	28,800
1909		31,647	1.00	31,647	49,156	80,803	.3824 [d]	30,900	.964	32,050
1910		34,116	1.00	34,116	49,751	83,867	.3913 [d]	32,820	.964	34,050
1911		38,570	1.00	38,570	50,318	88,888	.3971 [d]	35,300	.967	36,500
1912	38,253	44,024	1.00	44,024	51,392	95,416	.4009 [c]	38,253	.968	39,500
1913		45,784	1.00	45,784	50,120	95,904	.4025 [d]	38,600	.950	40,650
1914		46,265	1.00	46,265	51,568	97,833	.4034 [d]	39,470	.943	41,850
1915		51,172	1.00	51,172	50,284	101,456	.4061 [d]	41,200	.933	44,150
1916		61,919	1.00	61,919	50,468	112,387	.4072 [d]	45,760	.975	46,920
1917	52,160	76,996	1.00	76,996	50,932	127,928	.4077 [c]	52,160	.979	53,300
1918		86,702	1.00	86,702	50,904	137,606	.4083 [d]	56,185	.971	57,870
1919		103,756	1.15	90,223	50,318	140,541	.4087 [d]	57,440	.980 [h]	58,600 [h]

[a] Census figures—see Table 14A.
[b] See Table 14D, Column C.
[c] Computed.
[d] Read from a smooth curve.
[e] For origin, see text. Rates were raised 20 per cent on March 31, 1919.
[f] *Statistical Abstract of the U. S.* and Moody's *Manual of Public Utilities.*
[g] Estimated by means of a special study recorded in Table 2K.
[h] Tentative estimate only.

It is evident that among the regular employees of every industry, there are, at any given time, a considerable number who are not at work. This being true, the average number at work is necessarily always considerably less than the number who depend on the industry for a livelihood. The Census records only the number actually at work. In the last columns of Table 14I, this item has been adjusted in a way intended to give an approximation to the number attached to the industry. The mode of adjustment used is described in § 2d.

Table 14J is devoted to an estimate of the average amount received annually by each employee commonly employed by telegraph companies and the purchasing power of that amount on the basis of prices of 1913.

TABLE 14J

THE ESTIMATED AVERAGE ANNUAL COMPENSATION OF WORKERS NORMALLY EMPLOYED IN THE TELEGRAPH INDUSTRY OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F
Year	Estimated total compensation paid to employees [a] (Thousands)	Estimated number of employees normally attached to this industry [b]	Average money compensation per employee B ÷ C	Average index of prices of commodities bought by manual and clerical workers	Annual compensation of the average employee in dollars of 1913 value D ÷ E
1909	$17,600	32,050	$549	.955	$575
1910	19,100	34,050	561	.978	574
1911	21,750	36,500	596	.984	606
1912	25,659	39,500	650	.994	654
1913	27,450	40,650	675	1.000	675
1914	26,270	41,850	628	1.01	622
1915	26,400	44,150	598	1.03	581
1916	31,590	46,920	673	1.10	612
1917	40,435	53,300	759	1.29	588
1918	49,330	57,870	852	1.58	539
1919	50,490	58,600 [c]	862 [c]	1.773	486

[a] See Table 14G.
[b] See Table 14I.
[c] Tentative estimate only.

The errors in the data are too great to permit of drawing any conclusions from the minor fluctuations in the recorded wage, but apparently the purchasing power of the average employee's compensation tended somewhat downward after 1913, and in 1919 was no higher than it was in 1909. It is then evident that a gain in the percentage of the value product received does not necessarily mean an improvement in the general economic welfare of those employed in an industry.

CHAPTER 15

TELEPHONES

§ 15a. Introduction

Census Bureau reports on the telephone industry in 1907, 1912, and 1917 appear to be fairly complete, covering most facts of importance for all enterprises of any considerable size, and collecting a few facts concerning practically all telephone plants in the United States. This study is based upon the Census reports for those years. The American Telephone and Telegraph Company controls about four-fifths of the telephone business of the country, hence most interpolations have been made upon the basis of the reports of its operations as given in Poor's or Moody's *Manuals of Public Utilities.*

§ 15b. Share of Entrepreneurs and Other Property Owners

In this, as in other similar fields, the value product is estimated by ascertaining those sums which have originated through the activities of this particular industry and which have been disbursed to individuals or secured by the corporations engaged in the telephone business. To ascertain the amounts actually originating in the telephone industry, it is necessary first to deduct from gross payments of bond interest and dividends items of the same nature received from other corporations, since such items are accounted for in the field in which they originated.

Following our standard plan of procedure, it is next necessary to estimate the share of the entrepreneurs and other property owners in the value product for the intercensal years. Since the Bell system practically dominates the field, interpolations have been made on the basis of the consolidated financial statistics of the Bell companies as presented in Poor's and Moody's *Manuals of Public Utilities.* The computations are shown in Table 15B.

Table 15B shows that disbursements and surplus as measured in money both increased from 1907 to 1916 but that, since that date, although disbursements have continued to grow, less has been saved. However, these figures need to be corrected for changes in the price level. Table 15C has been constructed to show the approximate equivalent in consumption goods which the property owners could buy with their share of the product for each of the various years.

TABLE 15A

THE ESTIMATED SHARE OF THE VALUE PRODUCT OF THE TELEPHONE INDUSTRY OF THE CONTINENTAL UNITED STATES IN THE CENSUS YEARS DISBURSED TO THE PROPERTY OWNERS OR SAVED BY THE OWNING CORPORATIONS

	1907	1912	1917
1. Interest on Funded Debt[a] plus Dividends paid by Larger[n] Companies. (In Thousands)	$36,116[b]	$51,361[cd]	$66,561[e]
2. Interest on Funded Debt plus Dividends Received by Larger Companies. (In Thousands)	$ 1,025[b]	$ 4,365[d]	$ 4,496[ef]
3. Payments by larger Companies of Dividends and Interest Originating in the Telephone Industry.[r] (In Thousands)	$35,091	$46,996	$62,065
4. Net[t] Rent Paid by Larger Companies to Individuals. (In Thousands)	$ 1,092[g]	$ 1,597[dh]	$ 1,413[ic]
5. Dividends, Rent, and Interest on the Funded Debt Arising from the Operations of the Larger Companies.[s] (In Thousands)	$36,183	$48,593	$63,478
6. Estimated Ratio of Dividend, Rent, and Interest Payments of All Companies to Those of Larger Companies only	1.009[j]	1.0577[lm]	1.050[k]
7. Estimated Dividends, Rent, and Interest on the Funded Debt Originating in the Entire Telephone Industry.[o] (In Thousands)	$36,500	$51,500	$66,580
8. Savings or Corporate Surplus of the Larger Companies. (In Thousands)	$19,926[b]	$17,206[d]	$14,127[e]
9. Estimated Savings of All Companies.[p] (In Thousands)	$20,120	$18,210	$14,840
10. Estimated Total Savings plus Disbursements to the Property Owners.[q] (In Thousands)	$56,620	$69,710	$81,420

T. = U. S. *Census of Telephones.*

[a] Includes beside bond interest, small amount paid as interest on real estate mortgages.

[b] T. 1907, p. 65.

[c] In 1907, 76.7 per cent of all interest was interest on the funded debt and mortgages; in 1917 the percentage had increased to 94.4. The percentage in 1912 was assumed to be an average of these two, or 85.55 per cent. This percentage amounts to 17,240 thousands of dollars.

[d] T. 1912, p. 45.

[e] T. 1917, p. 42.

[f] Telephone officials state that the item of "Interest from Other Sources" includes but very small amounts of interest on bonds. It is assumed therefore that only 5 per cent, or 160 thousands of dollars, has been accounted for in the reports of other industries.

[g] The item of "Rent of Offices and Real Estate," as given in T. 1912, p. 46, cannot be used here, for it includes a large estimate for the rent of real estate owned by the telephone companies; hence actual rent paid is assumed to equal 0.684 × Rent in 1912, this being the ratio of the total operating expenses of 1907 to those of 1912.

[h] "Rent of Offices and Other Real Estate."

[i] Estimated on the basis of information obtained from telephone officials as being 47 per cent of all rentals.

[j] Assumed to vary in proportion to income; see T. 1907, p. 14.

[k] Assumed to vary as total revenue; see T. 1917, p. 10.

TABLE 15A NOTES —*Continued*

l Ratio obtained by following process: Ratio of wire mileage of small companies to large was .0646 in 1912 and .0560 in 1917. Ratio of revenue of small to large companies was .050 in 1917. Then X : .050 :: .0648 : .0560. Therefore X = .0577. The ratio sought is 1 + X, or 1.0577.

m T. 1912, p. 12. *n* Based on Census classification.

o Product of items in the two preceding lines; equivalent to all net disbursements to the propertied classes.

p Assumed that savings vary in the same proportion as do disbursements to property owners; hence the items in line 9 are the products of those in lines 6 and 8. In general this item may be too large because some small companies may have failed and their losses escaped the Census records or because some companies have not allowed enough for depreciation, or it may be too small because they charged new construction to operating expenses. Col. M. C. Rorty believes the recorded decline in savings is largely the result of erroneous accounting. Complete evidence being lacking, however, it seems best to accept the Census figures.

q Equals receipts as dividends, interest, and rent plus their claims to an ultimate division of the corporate savings; in other words the sum of the items in lines 7 and 9.

r Difference of items in two preceding lines.

s Sum of items in two preceding lines.

t The *net* rent is estimated as 70 per cent of the gross on the ground that 30 per cent is required to cover maintenance and depreciation.

TABLE 15B

THE CORPORATE SAVINGS AND THE AMOUNTS PAID TO ENTREPRENEURS AND OTHER PROPERTY OWNERS FROM THE VALUE PRODUCT OF THE TELEPHONE INDUSTRY OF THE CONTINENTAL UNITED STATES ESTIMATED FOR EACH YEAR

A	B	C	D	E	F	G	H	I
Year	Estimated total disbursements to propertied classes in Census years [a] (Thousands)	Bond interest and dividends paid by Bell Companies [c] (Thousands)	B ÷ C	Estimated total disbursements to propertied classes (Thousands) C × D	Estimated savings of all companies in Census years [g] (Thousands)	Surplus of Bell Companies [c] (Thousands)	F ÷ G	Estimated savings of all companies (Thousands) G × H
1907	$36,500	$28,317 [b]	1.289 [d]	$36,500	$20,120	$12,524 [b]	1.607 [d]	$20,120
1909		34,132	1.233 [e]	42,085		14,236	1.515 [e]	21,624
1910		36,718	1.211 [e]	44,465		14,277	1.470 [e]	20,987
1911		39,578	1.194 [e]	47,256		12,009	1.425 [e]	17,113
1912	51,500	43,665	1.179 [d]	51,500	18,210	13,221	1.377 [d]	18,210
1913		46,955	1.165 [e]	54,703		11,735	1.303 [e]	15,291
1914		49,245	1.155 [e]	56,878		10,002	1.243 [e]	12,432
1915		50,993	1.145 [e]	58,400		15,189	1.160 [e]	17,619
1916		53,539	1.139 [e]	60,981		22,079	1.090 [e]	24,066
1917	66,580	58,683	1.135 [d]	66,580	14,840	13,852	1.071 [d]	14,840
1918		62,846	1.128 [e]	70,890		12,213	1.070 [f]	13,068
1919		67,533	1.123 [e]	75,840		12,118	1.069 [f]	12,954

a See Table 15A. *b* Poor's *Manual of Public Utilities*, 1914, pp. 1092, 1096.

c See Moody's *Manual of Public Utilities*, 1920, p. 1363.

d Computed by division. *e* Read from a smooth curve.

f Computed by study of surpluses of non-Bell companies as recorded in Moody's *Manuals*.

g See Table 15A; also note *p* attached to that table.

The price index used in reducing corporate savings to a basis of purchasing power is one intended approximately to represent construction costs. It is a composite of indices representing hourly wages of labor and prices of the commodities used in the construction of telephone plants, weighted in proportion to the amount of each commodity used. The index was worked out by the statistical department of the American Telephone and Telegraph Company.

TABLE 15C

THE PURCHASING POWER OF THE CORPORATE SAVINGS AND THE DISBURSEMENTS MADE TO ENTREPRENEURS AND OTHER PROPERTY OWNERS FROM THE NET VALUE PRODUCT OF THE TELEPHONE INDUSTRY

	Disbursements to entrepreneurs and other property owners			Corporate savings		
A	B	C	D	E	F	G
Year	Rent, dividends, and bond interest [a] (Thousands	Index of prices of consumption goods purchased by wealthy classes [b] Base, 1913	Value at prices of 1913 (Thousands) B ÷ C	Corporate savings [a] (Thousands)	Index of construction costs [c]	Value at prices of 1913 (Thousands) E ÷ F
1907	$36,500			$20,120	1.023	$19,668
1909	42,085	.973	$43,253	21,624	.881	24,545
1910	44,465	.988	45,005	20,987	.903	23,241
1911	47,256	.995	47,493	17,113	.903	18,951
1912	51,500	1.000	51,500	18,210	.982	18,544
1913	54,703	1 000	54,703	15,291	1.000	15,291
1914	56,878	1 010	56,315	12,432	.968	12,843
1915	58,400	.996	58,635	17,619	1.059	16,637
1916	60,981	1 074	56,779	24,066	1.336	18,013
1917	66,580	1 198	55,576	14,840	1.495	9,926
1918	70,890	1 364	51,972	13,068	1 525	8,569
1919	75,840	1 628	46,585	12,954	1.607	8,061

[a] See Table 15B

[b] See Table 2F; applies to families spending on the average $25,000 annually for consumption goods.

[c] Calculated by the statistical department of the American Telephone and Telegraph Co., and furnished to the Bureau through the kindness of Col. M. C. Rorty.

A study of Table 15C shows that corporate savings have declined to half their former money value and to only a little over one-third of the purchasing power which they had at the beginning of the decade. This decline in savings has been going on at the same time that dividends have

been increasing somewhat. The purchasing power of the disbursements to the investors and property owners tended to increase until 1916, but, since that date, has fallen off sharply.

§ 15c. The Net Value Product and Its Distribution

The estimated net value product of the telephone industry is made up of four parts: namely, the corporate savings, the disbursements to entrepreneurs and other property owners already discussed, the share of the employees, and the uncollectible revenues, the last mentioned item representing valuable services received by consumers for which the recipients

TABLE 15D

AN ESTIMATE OF THE VALUE PRODUCT OF THE TELEPHONE INDUSTRY IN THE CONTINENTAL UNITED STATES AND THE SHARE OF THE EMPLOYEES THEREIN

Year	Total salaries and wages paid to employees as estimated from Census reports (Thousands)	Total payments to employees as estimated from reports of telephone companies[f] (Thousands)	Total share of entrepreneurs and other owners of property used in the industry[e] (Thousands)	Uncollectible revenues[g] (Thousands)	Total net value product[h] (Thousands)	Per cent of total value product going to employees
1907...	$68,279[a]	$71,737	$56,620	$ 784	$129,141	55.5
1909...		81,160	63,709	942	145,811	55.7
1910...		91,677	65,452	1,020	158,149	58.0
1911...		103,140	64,369	1,104	168,613	61.2
1912...	101,400[cb]	112,653	69,710	1,188	183,551	61.4
1913...		126,027	69,994	1,285	197,306	63.9
1914...		129,255	69,310	1,380	199,945	64.6
1915...		127,598	76,019	1,480	205,097	62.2
1916...		153,526	85,047	1,590	240,163	63.9
1917...	175,670[d]	172,740	81,420	1,731	255,891	67.5
1918...		194,169	83,958	1,900	280,027	69.3
1919...		245,420	88,794	2,080	336,294	73.0

[a] *U. S. Census of Telephones*, 1907, p. 16.
[b] 101,400 = 96,041 (the number employed by large systems), × 1.0577. The ratio 1.0577 is used because it is the best comparison at hand. Its computation is described in Note 1, Table 15A.
[c] *U. S. Census of Telephones*, 1912, p. 48.
[d] *U. S. Census of Telephones*, 1917, p. 10.
[e] See Table 15B, Column E, plus Column I.
[f] For derivation, see text.
[g] Based on U. S. Census, interpolations for intercensal years made by aid of a smooth curve.
[h] Sum of items in three columns immediately preceding.

have failed to make recompense. These four shares have been added and the sum appears in Table 15D.

The largest share in the value product of the telephone industry consists of the payments made to employees. These payments consist mainly of wages and salaries, but the employees also receive a considerable sum in the form of benefits and pensions. The totals as presented in Table 15D have been derived from reports of the important telephone companies. The closeness of these results to the Census figures makes it highly probable that both sets are approximately accurate. The reason for using these data rather than the Census figures themselves, is that the figures presented here are largely secured from a compilation of actual payments for each year, while the Census data are based upon estimates only.

The last column of Table 15D shows that the employees have been getting a steadily increasing share of the value product until, in 1919, their share absorbed nearly three-fourths of the net income arising from the industry.

But to know the share of the total product received does not tell whether each employee is better or worse off than before. This depends upon the number of employees as well as upon the total amount paid to employees.

§ 15d. The Number of Employees

Table 15E represents an estimate of the average number of employees attached to the telephone industry in each year. The estimate of the fraction of workers actually employed is based upon assumptions none too well established.[1] However, the internal evidence of the data apparently tends to substantiate the approximate correctness of the fraction presented. It is believed, therefore, that the figures shown in Table 15E are not very far from the truth.

[1] See § 2d.

TABLE 15E

THE ESTIMATED NUMBER OF EMPLOYEES ATTACHED TO THE TELEPHONE INDUSTRY OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G
Year	Number of employees of all telephone systems actually at work	Estimated number of employees of Bell Telephone Companies[d]	B ÷ C	Estimated number of employees actually at work in all systems C × D	Estimated fraction of number attached to industry who are actually employed	Estimated number of employees attached to industry E ÷ F
1907	144,169[a]	102,100	1.412[e]	144,169	.982	146,800
1909		101,300	1.412[f]	143,000	.957	149,500
1910		112,500	1.413[f]	159,000	.974	163,200
1911		127,200	1.414[f]	179,800	.970	185,300
1912	194,000[b]	137,100	1.415[e]	194,000	.949	204,500
1913		151,200	1.414[f]	213,800	.983	217,500
1914		152,000	1.413[f]	214,800	.952	225,600
1915		147,200	1.412[f]	207,900	.904	230,000
1916		168,100	1.411[f]	237,200	.980	242,000
1917	262,629[c]	186,100	1.411[e]	262,629	.982	267,400
1918		197,000	1.411[f]	278,000	.975	285,200
1919		204,100	1.411[f]	288,000	.982[g]	293,000[g]

[a] *U. S. Census of Telephones*, 1907, p. 16.
[b] *U. S. Census of Telephones*, 1912, p. 48, shows larger companies to have 96,041 employees. This number has been multiplied by 1.0577, the ratio obtained in Table I, note 1.
[c] *U. S. Census of Telephones*, 1917, p. 10.
[d] Read from smooth curve based on recorded number of employees on December 31st, of each year, as shown in Poor's and Moody's *Manuals*.
[e] Computed.
[f] Interpolated along a smooth curve.
[g] Tentative estimate only.

§ 15e. Average Annual Earnings of Employees

With estimates available of the total amount paid to employees by telephone companies and of the total number of employees attached to the industry, it is only necessary to divide the first item by the second in order to arrive at the average amount paid to each employee. This average, however, means little until it is divided by an index of the prices of such consumption goods as are purchased by employees. The results of computations along these lines are shown in Table 15F.

Column D of this table makes it evident that the average employee is at present receiving many more dollars per annum than was formerly the case. However, each of these dollars has bought so much less in recent

TABLE 15F

THE PURCHASING POWER OF THE COMPENSATION OF THE AVERAGE EMPLOYEE ATTACHED TO THE TELEPHONE INDUSTRY IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F
Year	Estimated total of payments to employees [a] (Thousands)	Estimated number of employees attached to industry [b]	Estimated amount paid to average employee attached to industry [e] B ÷ C	Index of prices of consumption goods bought by manual and clerical workers [c]	Estimated purchasing power of compensation paid to average employee [e] D ÷ E
1907	$71,737	146,800	$489		
1909	81,160	149,500	543	.955	$569
1910	91,677	163,200	562	.978	575
1911	103,140	185,300	557	.984	566
1912	112,653	204,500	551	.994	554
1913	126,027	217,500	579	1.000	579
1914	129,255	225,600	573	1.01	567
1915	127,598	230,000	555	1.03	539
1916	153,526	242,000	634	1.10	576
1917	172,740	267,400	646	1.29	501
1918	194,169	285,200	681	1.58	431
1919	245,420	293,000 [d]	838 [d]	1.773	473 [d]

[a] See Table 15D; includes wages, salaries, pensions, compensation for injuries, etc.
[b] See Table 15E.
[c] Bureau of Labor index extended back through special study by this Bureau. See Table 2C.
[d] Tentative estimate only.
[e] The decline in the average wage and its purchasing power is accounted for largely if not entirely by the large increase in the number of female as compared to male employees, the former constituting only 54 per cent of the total in 1907, but 70 per cent in 1920.

years that the actual purchasing power of the average employee's income from the telephone business was materially less in 1919 than it was in 1913. This decline in the average is, however, at least partly due to the fact that, during this decade, women have constituted a rapidly increasing fraction of the total number of telephone employees.

§ 15f. The Efficiency of the Employees

The increase or diminution in the efficiency of the telephone worker as a producer cannot be measured exactly because we have no record of the changes in the amount of effort required to transmit a message and also because an increase or decrease in efficiency is as likely to be a result of

better or worse equipment as of greater personal effort or effectiveness. For example, long telephone lines evidently take more effort to build and keep in repair than do short ones. It is more work to facilitate the passage of messages when several connections are necessary, than when only one is required. Nevertheless it seems worth while roughly to picture the results obtained under conditions as they exist.

In the absence of any more accurate criterion, it seems that the message mile might be used as a reasonable unit for measuring work accomplished by the telephone force. However, the number of message miles is not given and must be computed. The fact that millions of messages do not pass through an exchange vitiates to a degree the accuracy of the estimates presented. Nevertheless, it is not probable that this unknown item affects materially the relative comparison for different years, even though it undoubtedly prevents the possibility of obtaining an accurate measurement of the absolute number of message miles for any single year. The necessary assumptions in computing the number of message miles are based upon the fact that if every telephone were connected through an independent line directly with the central station, the average distance traveled by each message would approximately equal twice the number of miles of wire divided by the number of telephones. This quotient is used as a relative indicator of the distance that each message travels and is probably serviceable for that purpose even though its absolute value is of little significance. When the number of messages sent is multiplied by this index, the product gives some idea of the total distance through which telephone messages are transmitted; in other words, it is a crude approximation to the physical product of the industry. The facts are presented in Table 15G.

TABLE 15G

A COMPARISON FOR DIFFERENT YEARS OF THE PHYSICAL OUTPUT PER EMPLOYEE IN THE TELEPHONE INDUSTRY

A	B	C	D	E	F	G	H	I	J
Year	Total messages sent; as estimated from Census data (Millions)	Daily exchange connections by Bell Companies (Thousands)	B ÷ C	Estimated millions of messages sent C × D	Thousands of employees actually at work[f]	Messages per employee (Thousands) E ÷ F	Twice the number of miles of wire per telephone[j]	Approximate number of message miles	
								Total in billions E × H	Thousand per employee I ÷ F
1907	12,500[a]	18,130	690[d]	12,500[a]	144	86.7	4.25[g]	53.1	368
1909		19,925	670[e]	13,350	143	93.4	4.40	58.7	411
1910		21,681	662[e]	14,353	159	90.3	4.49	64.4	405
1911		23,484	657[e]	15,429	180	85.8	4.57	70.5	392
1912	16,753[b]	25,572	655[d]	16,753[b]	194	86.4	4.64[h]	77.7	401
1913		26,431	659[e]	17,418	214	81.5	4.71	82.0	384
1914		27,049	669[e]	18,096	215	84.2	4.77	86.3	402
1915		25,184	681[e]	17,150	208	82.5	4.83	82.8	398
1916		28,530	695[e]	19,828	237	83.6	4.88	96.8	408
1917	21,846[c]	30,845	709[d]	21,846[c]	263	83.2	4.92[i]	107.5	409
1918		31,264	723[e]	22,604	278	81.3	4.97	112.3	404
1919		29,561	738[e]	21,816	288	75.7	5.01	109.3	380

[a] Assumed that ratio of messages to telephones was same for non-reporting as for reporting companies. Under this assumption, messages on non-reporting lines amounted to 1,127 millions. See U. S. *Census of Telephones*, 1907, p. 14.

[b] Assumptions same as for 1907, making the estimated number of messages on non-reporting lines 3,018 millions. See U. S. *Census of Telephones*, 1912, p. 13.

[c] U. S. *Census of Telephones*, 1917, p. 10.

[d] Computed.

[e] Read from smooth curve.

[f] See Table 15E.

[g] U. S. *Census of Telephones*, 1907, p. 14.

[h] U. S. *Census of Telephones*, 1912, p. 13.

[i] U. S. *Census of Telephones*, 1917, p. 10.

[j] If message travels to central office and to another station the number here recorded should represent the approximate distance traveled by the message.

Although the number of messages per employee has declined materially, the trend of the number of message miles per employee has remained nearly constant. It does not appear, therefore, that there is any reason to believe that the efficiency of telephone employees shows any downward tendency. This statement is not controverted by the exceptionally low record in 1919 since this probably represents a temporary phenomenon rather than a permanent decline in output.

§ 15g. Telephone Revenue Compared for Residence and Business Telephones

It is an interesting fact that, during the earlier part of the decade, there was little change in the proportion of revenue arising from residence and from business telephones respectively. Since 1915, however, business telephones have slowly but steadily grown in relative importance as revenue producers. This change is indicated by the data in Table 15H.

TABLE 15H

PER CENT OF THE OPERATING REVENUE OF TELEPHONE COMPANIES DERIVED RESPECTIVELY FROM BUSINESS AND RESIDENCE STATIONS[a]

Year	Per cent derived from		
	Residence telephones	Business telephones	All telephones
1910	44.18	55.82	100.00
1911	44.35	55.65	100.00
1912	44.18	55.82	100.00
1913	44.13	55.87	100.00
1914	44.27	55.73	100.00
1915	44.11	55.89	100.00
1916	43.65	56.35	100.00
1917	43.16	56.84	100.00
1918	42.80	57.20	100.00
1919	41.96	58.04	100.00

[a] Computed from reports furnished by telephone companies. The percentages are not exact, but are presumably approximately correct.

§ 15h. Relative Growth of Telephone Service and Population

It is also of interest to know whether telephone service is or is not keeping pace with the growth of our population. Table 15I shows the probable facts in this connection.

TABLE 15I

THE ESTIMATED RELATIVE AMOUNT OF SERVICE PER PERSON IN THE CONTINENTAL UNITED STATES RENDERED BY THE TELEPHONE INDUSTRY

Year	Billions of messages sent [a]	Billions of message miles [a]	Thousands of persons in the Continental United States [c]	Messages per inhabitant	Message miles per inhabitant
1907	12.5	53.1	87,321 [b]	143	608
1909	13.4	58.7	90,370	148	650
1910	14.4	64.4	92,229	156	699
1911	15.4	70.5	93,811	164	752
1912	16.8	77.7	95,338	176	815
1913	17.4	82.0	97,278	179	843
1914	18.1	86.3	99,194	182	870
1915	17.1	82.8	100,428	171	825
1916	19.8	96.8	101,722	195	951
1917	21.8	107.5	103,059	212	1,043
1918	22.6	112.3	104,182	217	1,078
1919	21.8	109.3	104,847	208	1,042

[a] See Table 15G.
[b] *Statistical Abstract of U. S.* for 1918, p. 776.
[c] See Table 2A.

Table 15I makes it clear that telephone service, whether measured by messages or message-miles, is increasing very much faster than population—in other words, we are, as a nation, coming to depend more and more upon the telephone as a means of communication.

CHAPTER 16

TRANSPORTATION BY WATER

§ 16a. Sources of Information

The Census Bureau covered this field in the years 1906 and 1916, but the financial statistics presented are far from having the degree of completeness desired. The records of gross income, and of wages and salaries paid would, however, be of great assistance in solving our problems were it not that some of the totals presented are evidently very far from the truth. That serious errors really exist is clear if one compares the average wages paid to employees on land as shown by the Censuses of 1906 and 1916. The Census record indicates that this average wage declined, during the decade, from $665 to $450. All other sources agree, however, in showing that the period was characterized by sharply rising wages. An inquiry concerning this peculiarity of the data was sent to the Census Bureau and elicited the reply that the Census of 1916 was taken under difficulties due to the rapid shift in the personnel of the employees in water transportation. The Census Bureau officials, however, felt confident that the amounts stated as paid for wages and salaries are approximately correct, even though the number of employees may be materially in error. This belief, however, seems contrary to the facts for it involves the assumption that the number of employees diminished greatly during the decade. Overwhelming evidence including that in the Census report itself, proves that the number not only did not diminish but actually increased to a marked degree.

As a matter of fact, it appears that the Census data, as regards the number of employees, approximate the truth, but that the 1916 figures, because of the failure to include sufficient allowances for board and lodging, understate the total pay of employees on vessels.

For the reasons just stated, the assumption has been made that the Census figures for the average number of persons actually employed are, in each instance, reasonably accurate, and that the 1906 record is a correct picture of the average earnings of land workers at that date. It has also been assumed that the record of gross earnings is reasonably accurate for each of the Census years. These are the only Census figures which seem to be adapted to our particular needs.

It has been necessary to supplement the data thus obtained by material

derived from the reports of the Commissioner of Navigation and of the United States Shipping Board, and from the fragmentary information concerning steamship companies which appears in Poor's and Moody's *Manuals of Corporation Securities.*

§ 16b. Assumptions Made

The assumption has been made that the share of entrepreneurs and other property owners in the income arising from transportation by water comprises nothing but interest on bonds, dividends on stocks or distributed profits and business savings. There are doubtless other payments made directly to private parties, but of these we have no record, and they are probably not large enough materially to affect the totals. Similarly, the share of the employees is assumed to consist only of the money wages and salaries received plus an allowance for board and lodging furnished. Most of the figures are probably so inaccurate that further attempts at refinement in the assumptions made would be futile.

§ 16c. Mode of Estimating Gross Earnings

In estimating gross earnings for the intercensal years, recourse has been had to the use of a sequence of ratios. For each shipping company, the reports of which are shown in Poor's *Manual,* the ratio of the gross earnings for the given year to the earnings for the preceding year has been calculated and recorded. Earnings for the year 1909 have, however, been compared with those of 1906, (the Census year), the years 1907 and 1908 being skipped because, in this study, there is no attempt to derive estimates for years preceding 1909. Few shipping concerns have published reports for each year since 1906, hence the derivation of an accurate index of gross earnings is impossible. Under these circumstances, we have been forced to take the median of all the ratios for a given year as representing the proportionate change in gross earnings from the preceding period. These median ratios for the different years have been converted into an index on the base 1906 by a continued process of multiplication beginning with the ratio of 1909 to 1906, next applying thereto the ratio of 1910 to 1909, and so on. It can be demonstrated mathematically that an index computed in this manner tends, in the course of time, to rise above the true index. This tendency has been corrected by tying the indices thus derived to the Census estimates of total gross earnings; a process by which the upward slope is diminished materially and the error of the type just mentioned is presumably thus eliminated. The final estimate of gross earnings appears in Table 16A.

Having arrived at an approximate set of totals of gross earnings, the next step is to utilize these estimates as bases for computing the share of

TABLE 16A

THE ESTIMATED GROSS EARNINGS OF ALL PRIVATE CONCERNS IN THE CONTINENTAL UNITED STATES ENGAGED IN TRANSPORTATION BY WATER

A	B	C	D	E
Year	Gross income in thousands as reported by the Census [a]	Index of gross earnings estimated from reports of about twenty corporations [b]	Ratio of B to C	Estimated gross earnings of all concerns (Thousands) C × D
1906.....	$294,855	1.00	294,855 [c]	$294,855 [a]
1909.....		1.00	280,500 [d]	280,500
1910.....		1.10	275,700 [d]	303,300
1911.....		1.13	270,800 [d]	306,000
1912.....		1.27	266,100 [d]	338,000
1913.....		1.39	261,200 [d]	363,000
1914.....		1.29	256,600 [d]	331,000
1915.....		1.51	251,700 [d]	380,000
1916.....	563,736	2.28	247,300 [c]	563,736 [a]
1917.....		2.03	242,400 [d]	492,000
1918.....		1.79	237,400 [d]	425,000
1919.....		3.05	232,500 [d]	709,000

[a] *Census of Transportation by Water*, 1916, page 57.
[b] For derivation, see text.
[c] Computed by division.
[d] Interpolated along a straight line.

the entrepreneurs and property owners in the value product of each year. The mode of attack is as follows:

§ 16d. The Share of the Owners and Investors

For each shipping corporation dealt with in Poor's or Moody's *Manual*, the reports of which appear in such form as to make it possible, three ratios have been computed for each year; namely, the respective ratios of bond interest paid, dividends paid, and added surplus, to the gross earnings of the same year. In the case of bond interest, a weighted median of these ratios has been ascertained for each year, large companies like the International Mercantile Marine naturally having been given more weight than small concerns like the Montauk Steamship Company. The same procedure has been followed in obtaining the yearly medians of the ratios of surplus to gross earnings.[1] In the case of dividends, however, it was necessary to compute a weighted arithmetic average instead of a weighted

[1] The median was used because it eliminated the extreme variations in some of the samples. These extremes were not believed to be representative.

median of the ratios; for, in certain lean years, even though a few corporations paid very considerable dividends, the median ratio was zero.

The products obtained by multiplying the estimated gross earnings for the various years by the ratios obtained in the manner just described are believed to approximate the actual amounts falling into the respective categories. Table 16B shows the ratios and the estimated size of the various amounts which go to make up the share of the entrepreneurs and other property owners in the annual value product.

TABLE 16B

THE ESTIMATED SHARE OF ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE ANNUAL VALUE PRODUCT OF THE PRIVATE INDUSTRY OF TRANSPORTATION BY WATER

Calendar year	Estimated gross earnings in thousands [a]	Average ratio [b] to gross earnings of			Estimated share of entrepreneurs and other property owners [c] (Thousands)			
		Bond interest paid	Dividends paid	Amounts carried to surplus	Interest on funded debt	Profits disbursed	Business savings	Total
1909	$280,500	.0691	.0286	.0246	$19,380	$ 8,025	$ 6,900	$34,305
1910	303,300	.0623	.0550	.0835	18,900	16,680	25,320	60,900
1911	306,000	.0503	.0543	.0307	15,400	16,620	9,400	41,420
1912	338,000	.0521	.0424	.0725	17,620	14,320	24,510	56,450
1913	363,000	.0501	.0378	.0608	18,200	13,720	22,070	53,990
1914	331,000	.0502	.0543	—.0021	16,600	17,980	—695	33,885
1915	380,000	.0407	.0479	.0649	15,470	18,200	24,660	58,330
1916	563,736	.0374	.0418	.1189	15,000 [d]	23,550	67,030	105,580
1917	492,000	.0304	.1028	.0463	14,960	50,600	22,790	88,350
1918	425,000	.0293	.1013	.0699	12,460	43,050	29,720	85,230
1919	709,000	.0259	.1124	.0166	15,000 [d]	79,700	11,770	106,470

[a] See Table 16A.
[b] For mode of derivation, see text.
[c] Gross earnings multiplied by the appropriate ratios.
[d] Arbitrarily assumed, because original products seem too large, since it is unlikely that bond interest would change greatly from year to year.

While the share of the entrepreneurs and other property owners has increased greatly in terms of dollars, the change in their ability to secure commodities has been somewhat less striking. That such is the case is made clear by a study of Table 16C in which the current income of these classes has been converted into terms of purchasing power at the price level of 1913.

TABLE 16C

THE RELATIVE PURCHASING POWER IN TERMS OF CONSUMPTION GOODS OF THAT PART OF THE INCOME OF ENTREPRENEURS AND OTHER PROPERTY OWNERS DERIVED FROM TRANSPORTATION BY WATER

Calendar year	Disbursements to entrepreneurs and other property owners			Business savings		
	Profits and interest on funded debt [a] (Thousands)	Index of prices of goods consumed by wealthier families [b]	Purchasing power at prices of 1913 (Thousands)	Amount in thousands of dollars [c]	Index of construction costs [d]	Amount of construction purchasable at prices of 1913 (Thousands)
1909.....	$27,405	.964	$28,428	$ 6,900	.927	$ 7,443
1910.....	35,580	.982	36,232	25,320	.953	26,569
1911.....	32,020	.989	32,376	9,400	.945	9,947
1912.....	31,940	.999	31,972	24,510	.983	24,934
1913.....	31,920	1.000	31,920	22,070	1.000	22,070
1914.....	34,580	1.011	34,208	—695	.960	—724
1915.....	33,670	.999	33,704	24,660	.992	24,859
1916.....	38,550	1.081	35,661	67,030	1.194	56,139
1917.....	65,560	1.225	53,518	22,790	1.473	15,472
1918.....	55,510	1.406	39,481	29,720	1.499	19,827
1919.....	94,700	1.648	57,464	11,770	1.597	7,370

[a] Combination of the items in two columns of Table 16B.
[b] An average of the indices for families spending respectively $5,000 and $25,000 per annum for consumption goods.
[c] See Table 16B.
[d] An average of the U. S. Bureau of Labor Statistics indices for building labor, building materials, and metals, the weights used being, in the order named, 3, 1, and 2.

§ 16e. The Share of the Employees

The next step necessary is to ascertain the share of the product going to the employees in each year of the period. This end can apparently best be attained if the employees are first divided into the two classes used by the Census, namely those working on land and those employed on vessels.

It seems clear that the number of men required about the docks must vary in proportion to the amount of shipping to be handled. The criterion which has suggested itself as being the best adapted to measuring accurately shipping activity at our ports, is the tonnage of vessels entered and cleared. This tonnage is recorded for the foreign trade but not for the coastwise. In order to give some weight to the latter, the plan has been adopted of using a combination index constructed by adding to the sum of the tonnage in the foreign trade entered and cleared, one-fifth of the freight tonnage passing through the Sault Ste Marie Canal and five times

the tonnage of the vessels engaged in the coastwise trade. The "Soo" Canal traffic is weighted low because the handling of the grain and iron ore, which constitutes the bulk of the tonnage, requires relatively little labor. The weighting for coastwise vessels assumes that there are on the average five cargo handlings per year. However, the three indicators used vary so similarly that the relative size of the weights assigned is not a matter of great importance. The foreign trade figures for the period preceding 1918

TABLE 16D

THE ESTIMATED NUMBER AND EARNINGS OF LAND EMPLOYEES ENGAGED IN THE INDUSTRY OF TRANSPORTATION BY WATER

A	B	C	D	E	F	G
Calendar year	Number at work as reported by the Census	Index of tonnage loaded and unloaded [b]	Ratio of B to C	Estimated number at work C × D	Estimated average annual pay	Estimated total wages and salaries E × F
1906	47,419 [a]	109.8	432 [c]	47,419 [a]	$ 663 [a]	$31,456 [a]
1909		123.0	475 [d]	58,450	664 [e]	38,800
1910		128.5	488 [d]	62,750	665 [e]	41,720
1911		133.2	500 [d]	66,592	666 [e]	44,360
1912		145.6	512 [d]	74,480	698 [e]	52,000
1913		154.2	522 [d]	80,460	732 [e]	58,900
1914		144.4	530 [d]	76,540	732 [e]	56,050
1915		144.9	538 [d]	77,980	731 [e]	57,030
1916	83,581 [a]	153.2	545 [c]	83,581 [a]	808 [e]	67,560
1917		146.7	552 [d]	80,900	840 [e]	67,940
1918		144.6	556 [d]	80,400	1,012 [e]	81,400

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] For mode of derivation, see the text.
[c] Computed by division.
[d] Interpolated along a smooth curve.
[e] Assumed to vary from the 1906 wage in the same proportion as did the daily wages for longshoremen. See text for explanation.

are reported for years ending June 30, hence the pairs of fiscal years have been averaged in each case to give an estimate for the calendar year on which they overlap. These estimates for the calendar years have been combined with the other indicators in deriving the index used.

It has been assumed that the employees on land received, on the average in 1906, the $665, reported by the *Census of Transportation by Water*. This amount has been varied for the other years on the basis of the change in the daily rates of pay at New York City from 1906 to 1914 [1] and since

[1] Estimated from data given on page 80 of *The Longshoreman*, by Charles B. Barnes.

that date, in the daily rates for all sections of our coast.[1] The New York City rates have been weighted more heavily than the others because of the importance of this port.

The next necessary step in the procedure is to estimate the wages of the employees on vessels. Now it seems probable that the Census figures, as to the number of men employed, are approximately correct. The interpolation for the intercensal years has been on the basis of the reported tonnage of the American merchant marine, which seems to constitute a satisfactory criterion.

In computing the wage payments, it was, for reasons previously stated, found necessary to ignore the Census figures. Fortunately, the *Annual Reports* of the United States Commissioner of Navigation give detailed information each year concerning the wages paid to different classes of workers. From these reports, a median of monthly wages paid to able-bodied seamen on American steamships has been computed for each year. To this median wage has been added in each instance an allowance for board and lodging, this allowance having been made to vary in proportion to the food index computed by the United States Bureau of Labor Statistics.

On pages 188–9 and in Chapter IX of H. B. Drury's report on *Marine and Dock Labor*, statistics are given which enable one to compute, with a reasonable degree of accuracy, the ratio of the average pay of the entire ship's crew, including officers, to the average pay of able-bodied seamen. By applying this ratio, an estimate has been made of the average annual pay of workers on vessels. The final estimates appear in Table 16E.

[1] From the report dated December 31, 1918, of The National Adjustment Commission of the U. S. Shipping Board, p. 21, and from p. 150 of Bulletin 274 of the United States Bureau of Labor Statistics on *The Union Scales of Wages and Hours of Labor*, May 15, 1919.

TABLE 16E

THE ESTIMATED NUMBER AND EARNINGS OF THE EMPLOYEES ON THE VESSELS OF THE AMERICAN MERCHANT MARINE

A	B	C	D	E	F	G	H	I
Year	Number reported by U. S. Census	Tonnage of merchant marine of the U. S.[b] (Thousands)	Ratio of B to C	Estimated number of men actually at work C × D	Monthly wages of able seamen on American steam vessels: Median money wage[e]	Monthly wages of able seamen on American steam vessels: Estimated wage including board and lodging	Estimated average annual earnings of all employees[g]	Estimated total wages and salaries in thousands paid to employees on vessels E × H
1906	140,929[a]	6,675	.02111[c]	140,929	$25.84	$45.24	$ 788	$111,000
1909		7,389	.02019[d]	149,200	28.75	51.72	901	134,400
1910		7,508	.01990[d]	149,400	30.00	54.02	941	140,600
1911		7,639	.01958[d]	149,600	30.00	53.73	936	140,000
1912		7,714	.01930[d]	148,900	30.00	55.74	971	144,520
1913		7,887	.01900[d]	149,900	30.00	55.74	971	145,500
1914		7,929	.01870[d]	148,300	30.00	56.37	982	145,700
1915		8,389	.01839[d]	154,300	35.00	61.25	1,067	164,600
1916	153,301[a]	8,470	.01810[c]	153,301	47.60	77.15	1,344	206,100
1917		8,871	.01780[d]	157,900	58.85	96.73	1,685	266,000
1918		9,925	.01752[d]	173,900	68.75	112.17	1,954	339,800
1919		12,907	.01722[d]	222,200	75.00[f]	123.53[f]	2,152[f]	478,200[f]

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] *Statistical Abstract of U. S.* for 1919, p. 361.
[c] Computed by division.
[d] Interpolated along a straight line.
[e] Medians of wages for some 50 classes of able seamen. Data from *Annual Reports* of the U. S. Commissioner of Navigation. The items recorded are the averages of medians for the pairs of fiscal years overlapping on the calendar year.
[f] Preliminary figures.
[g] Items in column G multiplied by 17.42. For explanation, see text.

§ 16f. The Net Value Product and Its Division

We are now prepared to estimate the value product of the industry of Transportation by Water. The figures appear in Table 16F.

TABLE 16F

THE ESTIMATED TOTAL VALUE PRODUCT OF THE INDUSTRY OF TRANSPORTATION BY WATER AND THE PER CENT THEREOF GOING TO THE EMPLOYEES

Calendar year	Total value product [a] (Thousands)	Total share of entrepreneurs and investors [b] (Thousands)	Total wages and salaries paid [c] (Thousands)	Per cent of value product going to employees
1909	$207,505	$ 34,305	$173,200	83.5
1910	243,220	60,900	182,320	75.0
1911	225,780	41,420	184,360	81.7
1912	252,970	56,450	196,520	77.7
1913	258,390	53,990	204,400	79.1
1914	235,635	33,885	201,750	85.6
1915	279,960	58,330	221,630	79.2
1916	379,240	105,580	273,660	72.2
1917	422,290	88,350	333,940	79.1
1918	506,430	85,230	421,200	83.2

[a] Sum of the two following columns.
[b] See Table 16B.
[c] Sum of the last column in Table 16D and the last column in Table 16E.

It is clear that the employees in this line of work receive a high percentage of the value product as compared to those in many of the other fields. No tendency is apparent for their relative share either to increase or diminish as the years pass.

§ 16g. The Average Annual Earnings of Employees

The usual estimates of the numbers of men attached to the industry, the fluctuations in the average money earnings, and the purchasing power of these earnings on the basis of the prices of 1913 appear in Table 16G.

TABLE 16G

THE PURCHASING POWER OF THE AVERAGE ANNUAL EARNINGS OF THE EMPLOYEES IN THE PRIVATE INDUSTRY OF TRANSPORTATION BY WATER

A	B	C	D	E	F	G	H
Calendar year	Estimated average number of employees actually at work [c]	Estimated fraction of persons attached to industry actually at work [d]	Estimated number of employees normally attached to the industry B/C	Total wages and salaries paid [b] (Thousands)	Average annual earnings per employee attached to industry E/D	Index of prices of goods consumed by manual and clerical workers [e]	Purchasing power of earnings at prices of 1913 F/G
1906	188,348 [a]			$142,456			
1909	207,650	.927	224,002	173,200	$ 773	.955	$ 810
1910	212,150	.917	231,352	182,320	788	.978	806
1911	216,192	.906	238,623	184,360	773	.984	785
1912	223,380	.919	243,068	196,520	808	.994	813
1913	230,360	.930	247,699	204,400	825	1.000	825
1914	224,840	.899	250,100	201,750	807	1.01	799
1915	232,280	.922	251,931	221,630	880	1.03	854
1916	236,882 [a]	.936	253,079	273,660	1,081	1.10	983
1917	238,800	.934	255,675	333,940	1,306	1.29	1,012
1918	254,300	.925	275,000	421,200	1,532	1.58	969

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] See Table 16F.
[c] The sum of the items in Column E, Table 16D, and in Column E, Table 16E.
[d] Estimated in § 2d.
[e] The Bureau of Labor Statistics index carried back by means of a special study made by this Bureau; see § 2b.

Table 16G records clearly a marked gain in the economic welfare of the employees in the years 1915, 1916, and 1917. The other years of the period show no changes of moment in this respect. On the whole, the employees were evidently very much better off in 1918 than in 1909.

§ 16h. The Tonnage of the American Merchant Marine

The final step is to note the changes in the supply of American merchant shipping which have occurred during the years under consideration. Table 16H sets forth the facts as indicated by the official reports.

TABLE 16H

THE TONNAGE OF THE AMERICAN MERCHANT MARINE AS COMPARED TO THE POPULATION OF THE CONTINENTAL UNITED STATES

Year	Tonnage afloat [a]	Population in thousands [b]	Tonnage per capita
1909	7,388,755	90,370	0.0818
1910	7,508,082	92,229	.0814
1911	7,638,790	93,811	.0814
1912	7,714,183	95,338	.0809
1913	7,886,551	97,278	.0811
1914	7,928,688	99,194	.0799
1915	8,389,429	100,428	.0835
1916	8,469,649	101,722	.0833
1917	8,871,037	103,059	.0861
1918	9,924,518	104,182	.0953
1919	12,907,300	104,847	.1231

[a] *Statistical Abstract of the U. S.*, 1919, p. 361.
[b] See Table 2A.

This table shows that the merchant marine just about kept pace with population until the beginning of the European War. A moderate relative increase in 1915 and 1917 was followed by a large growth in 1918 and a tremendous expansion in 1919. The reasons for this development are too well known to require comment.

CHAPTER 17

BANKING [1]

§ 17a. Sources of Information

The data for this chapter are derived mainly from the Annual Reports of the Comptroller of the Currency. Unfortunately, the reports for banks other than national are incomplete in many respects and, even in the case of national banks, we have extremely meager information concerning the number of employees. Under the circumstances, the results obtained by this study must be considered as only moderately near the truth.

§ 17b. The Composition of the Net Value Product

The value product of the banking industry is distributed in the form of dividends to stockholders, additions to surplus, interest to depositors, and wages to employees. There is also a relatively small item representing donations to the Red Cross. Most of the interest paid on deposits other than savings doubtless is paid to business enterprises and is taken into account in the study of the various fields of industry. It has been arbitrarily assumed that an increase of 20 per cent in the interest paid by savings banks will be sufficient to cover those interest payments made to individuals which are utilized to defray living expenses or which enter into their private as opposed to their business resources.

§ 17c. Net vs. Gross Dividends

A large part of the amount paid in dividends by the bank consists merely in amounts passed along which are received from other industrial fields as returns for investments therein. Since such amounts have already been counted once, they must evidently be deducted here. The manner of estimating the net dividends originating in the banking field appears in Table 17A.

§ 17d. Undivided Profits

The net gains of the banking industry have to a large extent been kept in the business as surplus or undivided profits. The amounts of these items

[1] The figures cited in this report are those given for all banks and include banks in the Island Possessions. Their business is less than half a per cent. of the whole and is probably much less than the business of non-reporting banks in the Continental U. S. Under these circumstances, it has been deemed unnecessary to take the trouble to deduct the figures for the Island banks from the summaries.

TABLE 17A

AN ESTIMATE OF THE AMOUNT OF THOSE DIVIDENDS PAID BY THE BANKS OF THE UNITED STATES WHICH ORIGINATE IN THE BANKING BUSINESS

A	B	C	D	E	F	G	H	I	J
Calendar year	Loans, discounts and rediscounts (Middle of year)			Dividends paid by		Face value of corporate securities held by banks [c] (Millions)	Estimated average yield on securities (Rate)	Estimated income from securities (Thousands) G × H	Estimated dividends originating in banking (Thousands) F — I
	Of national banks [a] (Thousands)	Of all banks [c] (Thousands)	Ratio of C to B	National banks [b] (Thousands)	All banks [b] (Thousands) D × E				
1909	$5,036	$11,303	2.244	$99,446	$223,157	$2,669	.05	$133,455	$89,702
1910	5,430	12,459	2.294	110,292	253,010	2,670	.05	133,481	119,529
1911	5,611	12,983	2.314	117,493	271,879	3,029	.05	151,451	120,428
1912	5,954	13,892	2.333	120,103	280,200	3,218	.05	160,907	119,293
1913	6,143	14,568	2.371	120,427	285,532	3,275	.05	163,735	121,797
1914	6,430	15,288	2.378	117,327	279,004	3,357	.05	167,869	111,135
1915	6,660	15,722	2.361	114,216	269,664	3,417	.05	170,832	98,832
1916	7,679	17,812	2.320	120,131	278,704	3,957	.05	197,855	80,849
1917	8,958	20,594	2 299	127,658	293,486	4,257	.05	212,858	80,628
1918	10,148 [d]	22,515	2.219	132,683	294,424	4,147	.05	207,349	87,075
1919	11,024 [d]	25,301	2.295	141,690	325,300	4,234	.052	220,151	105,149

[a] *Annual Report* of the Comptroller of the Currency, 1919, Volume II, pp. 292-303.
[b] Average of pairs of fiscal years; *Annual Report* of the Comptroller of the Currency, 1920, Volume I, p. 49.
[c] This item has been estimated by a series of rather complex calculations from the various *Annual Reports* of the United States Comptroller of the Currency. Since 1915, the reports have been incomplete and the errors may therefore be considerable.
[d] *Annual Report* of the Comptroller of the Currency, 1919. Volume I, p. 175.
[e] *Ibid.*, p. 186.

are recorded in Table 17B as are also their approximate values at the 1913 price level, were they distributed to the stockholders.

The striking fact brought out by Table 17B is the very rapid gain in bank surplus during the latter part of the decade, this gain being accompanied by a considerable decline in the purchasing power of the net dividends disbursed and of the interest paid on savings deposits.[1] Obviously, this increase in surplus account has materially strengthened the financial situation of the banks.

[1] See Table 17C.

TABLE 17C

AN ESTIMATE OF THE PURCHASING POWER OF DIVIDENDS ORIGINATING IN THE BUSINESS AND INTEREST PAID ON SAVINGS DEPOSITS BY THE BANKS OF THE UNITED STATES

A	B	C	D	E	F	G
Calendar year	Dividends originating in banking [a] (Thousands)	Index of prices of goods consumed by wealthier classes [b]	Purchasing power of dividends at prices of 1913 $\frac{B}{C}$	Interest on savings deposits [c] (Thousands)	Index of prices of goods consumed by working classes [d]	Purchasing power of interest on savings deposits at prices of 1913 $\frac{E}{F}$
1909	$ 89,702	.965	$ 92,955	$133,680	.955	$139,979
1910	119,529	.983	121,596	146,568	.978	149,865
1911	120,428	.990	121,644	151,920	.984	154,390
1912	119,293	1.000	119,293	160,660	.994	161,630
1913	121,797	1.000	121,797	170,749	1.000	170,749
1914	111,135	1.011	109,926	178,441	1.01	176,674
1915	98,832	.999	98,931	181,133	1.03	175,857
1916	80,849	1.081	74,791	185,070	1.10	168,245
1917	80,628	1.225	65,819	197,600	1.29	153,178
1918	87,075	1.406	61,931	199,191	1.58	126,070
1919	105,149	1.648	63,804	214,747	1.773	121,121

[a] See Table 17A, Column J.

[b] Average of indices for classes spending annually for consumption goods $5,000 and $25,000 respectively.

[c] The amounts in this column are derived from the *Annual Reports* of the Comptroller of the Currency by multiplying the reported deposits in savings banks by 1.2, in order to allow for savings in other banks, and by assuming that the interest paid amounted to 3 per cent of these deposits. To this sum has been added the interest on postal savings deposits. The last named quantity is reported for 1920 and estimated for earlier years on the basis of deposits. Colonel M. C. Rorty suggests that the ratio of 1.2 is low for recent years as savings in other banks have been increasing rapidly of late.

[d] Bureau of Labor Statistics index carried back for earlier years—see Table 2C.

§ 17f. Employees, Salaries, and Wages

According to a special report made in 1918, the National banks of the United States employed in that year 86,845 persons. If the employees in other banks were as numerous in proportion to the volume of loans and discounts, it follows that all banks gave employment to about 192,500 persons in 1918 or about 6.66 employees per bank. The estimates of the numbers employed in the other years are made on the basis that in each year the average bank employed 6.66 persons, that being the case in 1918.

Presumably, unemployment is not an important factor in the banking

field, hence no distinction has been made between the number of employees actually at work and the number attached to the industry.

The total amounts paid for salaries and wages by National banks have been reported by the Comptroller of the Currency since 1917. It has been assumed that, previous to that date, these payments varied in proportion to the total expenses of the same class of banks. It has further been assumed that the ratio of salary and wage payments to the volume of combined loans and discounts was the same for other banks as for National banks. The figures resulting from these assumptions and calculations appear in Table 17D.

TABLE 17D

AN ESTIMATE FOR THE BANKS OF THE UNITED STATES OF THE NUMBER OF EMPLOYEES AND THE WAGES AND SALARIES PAID

A	B	C	D	E	F
Calendar year	Salaries and wages paid by all banks [a] (Thousands)	Number of employees attached to industry [a]	Average annual earnings per employee $\frac{B}{C}$	Index of prices of articles consumed by manual and clerical workers	Purchasing power of annual earnings at prices of 1913 $\frac{D}{E}$
1909.....	$115,400	149,900	$ 770	.955	$ 807
1910.....	122,700	153,900	797	.978	815
1911.....	136,900	162,300	843	.984	857
1912.....	148,900	167,860	887	.994	892
1913.....	160,900	173,000	930	1.00	930
1914.....	164,100	178,150	921	1.01	912
1915.....	183,400	180,300	1,017	1.03	987
1916.....	214,300	183,200	1,170	1.10	1,064
1917.....	230,200	186,000	1,238	1.29	959
1918.....	281,300	192,500	1,461	1.58	925
1919.....	361,650	194,000	1,864	1.773	1,051

[a] For mode of derivation, see the text.

The figures in Column F of Table 17D indicate that the economic condition of the employees has improved noticeably during the decade. However, the reader is warned against attaching great importance thereto, as the assumptions made are too numerous to permit of the results being anything more than rough approximations to the truth.

§ 17g. The Share of Salaries and Wages in the Value Product

It is now possible for us to estimate the fraction of the value product of the banking industry going to the employees. This is done in Table 17E.

TABLE 17E

AN ESTIMATE OF THE DIVISION OF THE NET VALUE PRODUCT ARISING FROM BANKING

A	B	C	D	E	F	G
Calendar year	Share of stockholders [a] (Millions)	Share of holders of savings accounts [b] (Millions)	Share of Red Cross [c] (Millions)	Share of employees [d] (Millions)	Total net value product (Millions) B+C+D+E	Per cent of value product going to employees $\frac{100E}{F}$
1909.....	$185	$134	$0	$115	$ 434	26.6
1910.....	235	147	0	123	504	24.3
1911.....	227	152	0	137	516	26.5
1912.....	211	161	0	149	521	28.6
1913.....	177	171	0	161	509	31.6
1914.....	173	179	0	164	515	31.9
1915.....	168	181	0	183	532	34.5
1916.....	204	185	0	214	604	35.5
1917.....	233	198	0	230	661	34.8
1918.....	281	199	5	281	767	36.7
1919.....	439	215	3	362	1,018	35.5

[a] See Column F of Table 17B.
[b] See Column E of Table 17C.
[c] Estimated from the *Annual Reports* of the U. S. Comptroller of the Currency; averages for pairs of fiscal years.
[d] See Column B of Table 17D; comprises wages and salaries only.

It is clear that not only did the value product of the industry nearly double during the decade, but apparently the per cent of that product going to the employees increased steadily throughout the period. Again, however, it must be kept in mind that information concerning the employees is too scanty to justify laying much stress on this tentative conclusion. It is certain, however, that the relative share of the employees in the net value product is much smaller than in the fields of manufacturing or transportation.

§ 17h. Banking Facilities Compared to Population and Income

It is a matter of interest to note whether or not the people of the United States are becoming increasingly dependent upon banking facilities in the conduct of their business. Table 17F presents certain facts that bear upon this problem.

TABLE 17F

A COMPARISON OF COMBINED LOANS AND DEPOSITS WITH THE POPULATION OF THE UNITED STATES AND WITH THE TOTAL INCOME OF THE PEOPLE

A	B	C	D	E	F	G	H
Middle of year	Sum of loans and individual deposits[a] (Millions)	Estimated population of the U. S.[b] (Thousands)	Per capita combined loans and deposits $\frac{B}{C}$	Index of wholesale prices[c]	Purchasing power of per capita loans and deposits at prices of 1913 $\frac{D}{E}$	Estimated income of the people of the United States[d] (Millions)	Ratio of combined loans and deposits to the national income $\frac{B}{G}$
1909.....	$25,338	90,370	$280	.97	$289	$28,775	.8805
1910.....	27,742	92,229	301	.99	304	31,766	.8733
1911.....	28,889	93,811	308	.95	324	31,188	.9263
1912.....	30,916	95,338	324	1.01	321	33,554	.9214
1913.....	32,044	97,278	329	1.00	329	35,580	.9006
1914.....	33,806	99,194	341	1.00	341	33,936	.9962
1915.....	34,857	100,428	347	1.01	344	36,109	.9653
1916.....	40,585	101,722	399	1.24	322	45,418	.8936
1917.....	46,884	103,059	455	1.76	259	53,860	.8705
1918.....	50,322	104,182	483	1.96	246	60,366	.8336
1919.....	58,366	104,847	557	2.12	264		

[a] *Annual Report* of the Comptroller of the Currency, 1919, Vol. I, p. 186.
[b] Estimated by means of a special study recorded in § 2a.
[c] U. S. Bureau of Labor Statistics, *Bulletin 269*, p. 15.
[d] See Volume I, Table 2.

Column F of Table 17F makes it clear that bank accommodation is just about keeping pace with population, but that it is not growing quite as rapidly as the total income of the people of the nation.

§ 17i. Changes in the Volume of Business per Bank

It is also worth while to ascertain whether or not there is a tendency for banks to grow larger on the average. If so, it should be apparent in the average of loans and deposits per bank. The facts are set forth in Table 17G.

TABLE 17G

THE AVERAGE VOLUME OF COMBINED LOANS AND INDIVIDUAL DEPOSITS IN THE BANKS OF THE UNITED STATES

A	B	C	D	E	F
Middle of year	Sum of loans and individual deposits [a] (Millions)	Number of banks [a]	Loans and deposits per bank (Millions) $\frac{B}{C}$	Index of wholesale prices [b]	Purchasing power of loans and deposits per bank at prices of 1913 (Millions) D ÷ E
1909....	$25,338	22,491	$1.13	.97	$1.17
1910....	27,742	23,095	1.20	.99	1.21
1911....	28,889	24,392	1.18	.95	1.24
1912....	30,916	25,195	1.23	1.01	1.22
1913....	32,044	25,993	1.23	1.00	1.23
1914....	33,806	26,765	1.26	1.00	1.26
1915....	34,857	27,062	1.29	1.01	1.28
1916....	40,585	27,513	1.48	1.24	1.19
1917....	46,884	27,923	1.68	1.76	.95
1918....	50,322	28,880	1.74	1.96	.89
1919....	58,366	29,123	2.00	2.12	.94

[a] *Annual Report* of U. S. Comptroller of the Currency, 1919, Volume I, p. 186.
[b] U. S. Bureau of Labor Statistics, *Bulletin 269*, p. 15.

It is clear that, on the average, a bank could finance less business at the end of the decade than in the earlier years. If, as is sometimes asserted, there is increasing concentration in the banking business, it must then lie in greater control of some banks by others and not in the growth in the size of the average bank, since this still remains a relatively small concern.

CHAPTER 18

ALL BRANCHES OF GOVERNMENT

§ 18a. The Components of the Net Value Product

In dealing with the product of government, the same criterion is used that has been applied in the industrial fields previously studied; namely, what book or money income do individuals, as such, derive therefrom? Evidently, governmental units expend great amounts for wages and salaries, but they pay no dividends. Large sums are, however, disbursed in interest, mostly to private individuals but to no inconsiderable extent to banks. The interest going to banks must not be included in the governmental value product since it is already accounted for as a receipt in the banking industry. In this study, the net value product of government will, then, be considered simply as the total of wages, salaries, pensions, gratuities, and interest paid to private individuals.

Because of the nature of the available statistics government expenditures have been divided into four main classes:

1. Federal.
2. State and County.
3. City and Village.
4. School Districts.

§ 18b. The Number of Employees

One of the most difficult parts of the study has been to estimate the number of employees engaged in each of these governmental fields. For the United States Government, the sources made use of are the *Official Register*, the *Statistical Abstract*, and the *Annual Reports* of the Secretary of War and of the Postmaster General. While the results are not highly accurate, it is almost certain that the errors in the estimates of the number of Federal employees are relatively small.

It is difficult, however, to obtain any reasonably accurate figures concerning the numbers of State and County employees. The United States Census of Occupations gives practically no aid, for it records only officials, [1] leaving out of account the army of clerks, stenographers, etc., who far outnumber those who are their superiors in rank. The desired number has therefore been estimated by ascertaining from a study of *The*

[1] Even these are doubtless often entered under their professions.

Census of Wealth, Debt and Taxation and of *The Financial Statistics of States*, the approximate total amounts paid as wages and salaries in the various years and then dividing these totals by the average compensation for the services of State and County employees in New York as approximated from the reports of the State Civil Service Commission. While we have no reason for believing that New York salaries are especially non-representative, a much wider base would be necessary before one could feel confidence in the results. However, time was lacking to utilize fully the scanty and ill-assorted material scattered through some of the State reports, or to canvass thoroughly all of the State records in the hope of finding better organized results which perchance may there exist. Even the rather crude analysis here made represents the results of several weeks of search and calculation.

The determination of the number of city and village employees offered a problem only slightly less difficult of solution. Using the United States Census reports and interpolating by aid of the police and fire department records of several large cities, it was found possible to approximate reasonably well the number of policemen and firemen in all cities. It is believed therefore that the results in this field are satisfactory. The number of other city employees was estimated by first calculating the total wages and salaries paid to city employees, using for this purpose the reports of the auditors or comptrollers of various cities, and the *Financial Statistics of Cities* published by the United States Census Bureau. The total for each year was divided by an average wage estimated from the same sources in order to obtain the approximate number of employees attached to the industry. In this instance, a large quantity of usable data were found and the results are therefore somewhat more dependable than in the case of the States and Counties, although they are far from exact. [illegible] summarizes the estimates.

In calculating the number of [illegible] States Commissioner of Education [illegible] These reports give [illegible] fairly satisfactory [illegible] The number of [illegible] mentary evidence. [illegible] accurate.

TABLE 18A

AN ESTIMATE[b] OF THE NUMBER OF PERSONS EMPLOYED BY THE VARIOUS BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES

Year	Thousands of employees attached to various branches of government								
	All branches	United States			States and Counties[a]	Cities and villages			School districts[a]
		Army, navy and marines	Postal service	General government		Police and fire departments	Municipal utilities	General government	
1909	1,565	135	280	142	161	96	29	149	573
1910	1,620	133	283	144	173	97	30	169	591
1911	1,671	137	283	147	184	100	31	181	607
1912	1,727	145	287	148	195	102	32	192	626
1913	1,785	148	291	150	211	108	33	200	644
1914	1,866	159	293	160	231	108	34	212	669
1915	1,955	166	296	174	250	111	35	228	694
1916	2,037	200	298	190	255	112	36	232	714
1917	2,691	786	300	232	253	115	37	235	733
1918	5,129	3,038	290	433	254	114	39	238	724

[a] Teachers employed by States are included under "School Districts."
[b] For derivation of the items in this table see the text.

§ 18c. The Amount Paid in Wages or Salaries

As previously stated, information is very incomplete concerning the amount of salaries paid by governmental units. The Departments of the Federal Government rarely give the complete totals anywhere in their reports and, in many instances, wages and other expenses are so confused that they cannot be separated. The results here given must, therefore, be regarded only as approximations to the truth, although the existence of reliable data for important payments made by the Department of Agriculture, the army and navy, and the Post Office Department make it improbable that the errors in this field are unduly large.

The estimates for States and Counties are made by assuming that the proportion of their total expenditures going as wages and salaries is the same as in the State of New York. The total expenditures are estimated from the Census reports on the *Financial Statistics of States* and on *Wealth, Debt, and Taxation*. The result cannot be deemed more than a reasonable approximation.

The salary and wage payments to employees by the general government of cities and villages are computed on the basis of the records of the sample cities of Chicago, Cincinnati, Providence and San Francisco. The assumption has been made that wages and salaries absorb the same proportion of general governmental costs in other cities as in the average of these

four. The total general governmental costs are estimated from the figures appearing in *The Financial Statistics of Cities.* The results here stated must be considered as rather rough approximations to the truth.

The estimates for the pay of employees of municipal utilities, being computed along somewhat similar lines, are only slightly more accurate. The figures for policemen and firemen are, however, believed to be much nearer the truth, being based upon the rather reasonable assumption that average wages in New York, Chicago, Boston, Charleston, and Washington (the cities for which records are available), are fairly typical for the entire nation. The figures for school employees are greatly strengthened by the fact that the United States Commissioner of Education presents nearly complete data for teachers in the public schools. The chief possibility of error arises from the lack of any but extremely fragmentary data concerning the amounts paid for the services of janitors and other non-teaching employees of school districts, colleges, and universities.

The general results are summarized in Table 18B.

TABLE 18B

AN ESTIMATE[b] OF THE TOTAL AMOUNTS DISBURSED BY VARIOUS BRANCHES OF GOVERNMENT IN DIRECT PAYMENT FOR THE SERVICES OF EMPLOYEES

Calendar year	Millions of Dollars Paid by								
	All branches of government	Federal government			States and counties	Cities and villages			Schools
		Army, navy and marine corps[a]	Post office Department	Miscellaneous civil departments		Police and fire departments	Municipal utilities	Miscellaneous civil departments	
1909..	$1,157	$ 113	$153	$148	$151	$113	$25	$158	$296
1910..	1,236	110	160	157	166	122	26	180	316
1911..	1,300	112	166	156	181	126	26	196	337
1912..	1,378	119	174	156	199	132	27	210	362
1913..	1,470	123	187	163	222	137	30	221	387
1914..	1,571	128	199	177	250	141	33	229	414
1915..	1,684	133	206	194	276	144	33	256	441
1916..	1,814	182	214	211	287	146	35	264	476
1917..	2,530	769	220	271	293	151	37	268	521
1918..	4,591	2,391	243	572	305	164	39	299	578

[a] Includes allowance for board, lodging, clothing, etc., furnished.
[b] For derivation, see text.

§ 18d. The Average Annual Earnings of Employees

The division of the items in Table 18B by the corresponding ones in Table 18A gives the figures appearing in Table 18C, these figures representing the average annual pay per employee in each of the divisions considered.

TABLE 18C

AN ESTIMATE[a] OF THE AVERAGE ANNUAL PAY PER EMPLOYEE IN VARIOUS BRANCHES OF GOVERNMENTAL SERVICE IN THE CONTINENTAL UNITED STATES

Calendar Year	All Branches of Government	Federal Government			States and Counties	Cities and Villages			Schools
		Army, navy, and marine corps[b]	Post office Department	Miscellaneous civil		Police and fire departments	Municipal utilities	Miscellaneous civil	
1909	$739	$838	$547	$1,040	$ 938	$1,176	$ 843	$1,058	$517
1910	763	830	565	1,090	958	1,249	845	1,066	535
1911	778	818	585	1,061	982	1,262	845	1,079	555
1912	798	819	608	1,055	1,018	1,289	855	1,091	578
1913	823	830	644	1,088	1,053	1,263	903	1,103	601
1914	842	808	678	1,108	1,083	1,314	951	1,077	619
1915	861	803	696	1,117	1,104	1,291	954	1,120	635
1916	891	912	718	1,113	1,125	1,302	964	1,138	666
1917	940	978	736	1,165	1,157	1,314	982	1,141	711
1918	895	787	839	1,320	1,203	1,441	1,014	1,257	798

[a] For mode of derivation, consult text.
[b] Includes an allowance for board, lodging, clothing, etc., furnished.

In Table 18D the average pay is reduced to purchasing power at a constant price level.

TABLE 18D

AN ESTIMATE OF THE PURCHASING POWER AT PRICES OF 1913 OF THE PAY OF THE AVERAGE EMPLOYEE IN EACH OF THE LEADING BRANCHES OF GOVERNMENTAL SERVICE

Calendar year	Index of prices of goods used by working classes	Purchasing power of annual earnings of employees of [a]								
		All branches of government	Federal Government			States and Counties	Cities and Villages			Schools
			Army, navy and marine corps [b]	Post office Department	Miscellaneous civil departments		Police and fire departments	Municipal utilities	Miscellaneous civil departments	
1909	.955	$774	$877	$573	$1,089	$ 982	$1,231	$883	$1,108	$541
1910	.978	780	849	578	1,115	980	1,303	864	1,090	547
1911	.984	791	831	595	1,078	998	1,283	859	1,097	564
1912	.994	803	824	612	1,061	1,024	1,297	860	1,098	581
1913	1.00	823	830	644	1,088	1,053	1,263	903	1,103	601
1914	1.01	833	800	671	1,097	1,073	1,301	942	1,066	613
1915	1.03	836	780	676	1,084	1,072	1,253	926	1,087	617
1916	1.10	810	829	653	1,012	1,023	1,184	876	1,035	605
1917	1.29	729	758	571	903	897	1,019	761	884	551
1918	1.58	567	498	531	835	761	912	642	796	505

[a] Derived by dividing the respective items in Table 18C by the indices in the second column of this table.

[b] Includes an allowance for subsistence.

The figures in Table 18D indicate that from 1909 to 1915, the earnings of governmental employees were increasing steadily but that after that date, mainly because of the sharp rise in the price level, nearly every class suffered a loss in economic prosperity measured in terms of the amount of commodities that the salaries would buy.

§ 18e. Pensions

In addition to the sums paid out as wages and salaries for present labor, governments expend large sums as pensions and annuities, payments which may best be thought of as payments for services rendered in the past by the employees of that day. The largest item in this list is, of course, the army pension list, and records for this line are complete. It is feasible also to obtain a general idea of the amounts paid by State and local governments for pensions and gratuities. The final results of a compilation of data on this subject are recorded in Table 18E.

TABLE 18E

APPROXIMATE AMOUNT OF PENSIONS AND GRATUITIES PAID OUT BY THE VARIOUS BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES

Year	Thousand of dollars				
	All branches of government	City and village [a]	County [b]	State [b]	Federal [c]
1909.....	$186,520	$ 5,900	$ 9,246	$10,400	$160,974
1910.....	185,458	6,062	9,746	11,000	158,650
1911.....	185,491	8,398	10,287	11,650	155,156
1912.....	196,053	9,300	10,854	12,320	163,579
1913.....	207,965	10,125	11,475	13,070	173,295
1914.....	205,951	10,845	12,198	13,940	168,968
1915.....	201,918	11,705	12,993	14,883	162,337
1916.....	202,883	12,800	13,993	16,065	160,025
1917.....	216,197	13,960	14,810	17,062	170,365
1918.....	250,540	14,880	16,087	18,576	200,997

[a] Estimated from the *Financial Statistics of Cities* issued by the Census Bureau.
[b] Estimated from the *Financial Statistics of States* published by the Census Bureau.
[c] *Statistical Abstract of the United States*, 1919, p. 741.

§ 18f. Interest on Public Debts

The principal payments [1] made by government as a return for the services of property consist of interest on the public debt. A considerable share of this interest is paid to banks and, being accounted for in their income, is therefore excluded from the net value product of government. It is impossible to measure with accuracy the total volume of such interest payments; but data are available indicating the approximate amount of domestic governmental securities held by banks and by applying to this total an estimated interest rate, one is enabled to approximate the amount of this kind of interest payments made each year. Table 18F indicates the procedure followed.

Corporations other than banks receive no inconsiderable share of the bond interest paid by government, but since bond interest receipts are excluded from the value product of such corporations it follows that interest payments made to them must be treated just like those made to individuals. They have therefore been counted as part of the value product of government.

There is, however, strong ground for contending that most governmental interest payments, no matter to whom paid, should be excluded from the

[1] Some money is expended for rent of leased buildings, but the amount is normally small and hence has been omitted in this study.

TABLE 18F

AN ESTIMATE[a] OF THE AMOUNT OF INTEREST PAID BY ALL BRANCHES OF GOVERNMENT TO THE BANKS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I	J
Year	Federal securities held by banks (Millions)	Estimated average interest rate on Federal securities	Estimated interest on Federal securities (Thousands) B × C	State and local securities held (Millions)	Estimated average interest rate on State and local securities	Estimated interest on State and local securities (Thousands)	Federal, State and local securities held by banks (Millions) B + E	Estimated average interest rate on all securities	Interest paid to banks on all government securities (Thousands) D + G or H × I
1909....	$784	.021	$16,464	$1,091	.045	$49,095	$1,874		$65,559
1910....	778	.021	16,338	1,246	.045	56,070	2,024		72,408
1911....	773	.021	16,233	1,200	.045	54,000	1,972		70,233
1912....	822	.021	17,262	1,273	.045	57,285	2,095		74,547
1913....	818	.021	17,178	1,240	.045	55,800	2,058		72,978
1914....	819	.021	17,199	1,353	.045	60,885	2,173		78,084
1915....	811	.021	17,031	1,489	.045	67,005	2,300		84,036
1916....	[b]			[b]			2,289[c]	.037	84,693
1917....	[b]			[b]			2,520[c]	.037	93,240
1918....	[b]			[b]			4,601[c]	.037	170,237
1919....	[b]			[b]			7,127[c]	.040	285,080

[a] All calculations based upon data in the *Annual Reports* of the Comptroller of the Currency. The interest rates are estimated upon the basis of scattered and incomplete data.

[b] Data not available.

[c] Obtained from the *Annual Reports* of the Comptroller of the Currency by subtracting from the total value of securities held by banks the estimated amount of foreign and corporate securities held.

net income of the people. For reasons discussed in § 1m, it has been decided that accurate accounting requires their retention.

An estimate of the disbursements by the various branches of government in the form of interest paid to private parties is presented in Table 18G.

TABLE 18G

AN ESTIMATE OF THE TOTAL AMOUNT OF INTEREST PAID TO INDIVIDUALS BY THE DIFFERENT BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES

Year	Millions of dollars paid				
	A	B	C	D	E
	Interest paid to banks and individuals by			By all branches of government to banks [c]	By all branches of government to private individuals C — D
	Federal government [a]	State and local government [b]	All branches of government A + B		
1909	$ 22	$140	$162	$ 65	$ 96
1910	21	172	193	72	121
1911	22	184	206	70	136
1912	23	194	216	75	142
1913	23	201	224	73	151
1914	23	219	242	78	164
1915	23	241	264	84	180
1916	24	251	275	85	190
1917	111	259	370	93	277
1918	407	274	680	170	510

[a] *Statistical Abstract of the United States* for 1919, p. 756,—averages for pairs of fiscal years.

[b] Data from the *Census of Wealth, Debt, and Taxation* for 1913, Vol. II, pp. 40–43 and from the *Financial Statistics of States*, and the *Financial Statistics of Cities* published by the Bureau of the Census.

[c] See Table 18F, Column J.

Table 18G shows clearly the steady increase in interest payments by governmental units to private recipients and the especially rapid rise in 1917 and 1918 due mainly to the sale of Liberty Bonds by the Federal Government. Before that date, the Federal debt was practically stationary, the increase nearly all coming from State and local governments.

§ 18g. The Net Value Product and Its Division

We are now in a position to measure the total value product of government and the percentage thereof going to employees. For reasons previously stated, government pensions, like pensions paid by corporations, have been included with the share of the employees. The items have, however, been separately stated so that anyone who disagrees with this

point of view can easily make such adjustments as he may believe necessary. In any case, the effect on the percentage will not be very great.

TABLE 18H

THE NET VALUE PRODUCT OF ALL BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES AND THE PERCENTAGE THEREOF GOING AS PAYMENT FOR THE SERVICES OF PAST AND PRESENT EMPLOYEES

A	B	C	D	E	F	G
Year	Wages and salaries [a] (Millions)	Pensions and gratuities [b] (Millions)	Share of employees, past and present (Millions) B + C	Interest payments to private individuals [c] (Millions)	Net value product of government (Millions) D + E	Per cent of value product going to employees $\frac{100D}{F}$
1909	$1,157	$187	$1,343	$ 96	$1,440	93.3
1910	1,236	185	1,422	121	1,542	92.2
1911	1,300	185	1,486	136	1,622	91.6
1912	1,378	196	1,574	142	1,716	91.7
1913	1,470	208	1,678	151	1,829	91.7
1914	1,571	206	1,777	164	1,941	91.6
1915	1,684	202	1,886	180	2,036	91.3
1916	1,814	203	2,017	190	2,207	91.4
1917	2,530	216	2,746	277	3,023	90.8
1918	4,591	251	4,842	510	5,352	90.5

[a] See Table 18B
[b] See Table 18E.
[c] See Table 18G, Column E.

It is clear that past or present employees get most of the net value product of government, only about one-tenth of the whole going to the creditors in the form of interest. In 1917 and 1918 there is discernible a slight diminution in the percentage going to employees, a diminution which will probably increase in 1919 and 1920 owing to the increased size of the Federal debt, and the smaller number of Federal employees.

Having arrived at the net value product of the different branches of government within the United States, it is a matter of interest to reduce the results to terms of purchasing power. This is done in Table 18I.

A glance at Table 18I makes it evident that governmental outlays have more than doubled during the decade, even when all the effects of price inflation have been eliminated. The very sharp increase in 1918 was mainly due to the war and may of course soon be partially offset by reductions.

TABLE 18I

AN ESTIMATE OF THE PURCHASING POWER AT PRICES OF 1913 OF THE NET VALUE PRODUCT OF ALL BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H
Year	Total share of past and present employees [a] (Millions)	Index of prices of goods consumed by manual and clerical workers [b]	Purchasing power of share of employees [d] at prices of 1913 (Millions) B ÷ C	Interest paid to individuals [c] (Millions)	Index of prices of goods consumed by individual holders of government securities [e]	Purchasing power of share of security holders (Millions) E ÷ F	Purchasing power of net value product of government (Millions) D + G
1909...	$1,343	.955	$1,407	$ 96	.964	$100	$1,507
1910...	1,422	.978	1,453	121	.983	123	1,576
1911...	1,486	.984	1,510	136	.989	138	1,648
1912...	1,574	.994	1,584	142	.998	142	1,726
1913...	1,678	1.000	1,678	151	1.000	151	1,829
1914...	1,777	1.01	1,759	164	1.011	162	1,921
1915...	1,886	1.03	1,831	180	1.006	179	2,010
1916...	2,017	1.10	1,834	190	1.084	175	2,009
1917...	2,746	1.29	2,129	277	1.234	224	2,353
1918...	4,842	1.58	3,064	510	1.439	354	3,419

[a] See Table 18H, Column D; includes pensions.
[b] U. S. Bureau of Labor Statistics index carried back by means of a special study; see Table 2C.
[c] See Table 18G, Column E.
[d] Includes pensions.
[e] A combined index for working class families and families spending respectively $5,000 and $25,000 annually for consumption goods, the weights in order being 1, 1 and 2.

§ 18h. The Per Capita Net Value Product

It is worth while to compare next the relative rates of growth of the net value product of government when reduced to terms of constant price level, with the increase in the population of the country. This comparison appears in Table 18J.

The decade has increased the purchasing power of income derived from government to about twice as much per person in the United States as was the case in 1909, but the really striking increase did not come until the advent of the war, most of it being in 1919. This index represents fairly well the relative services of government to the people and its burdensomeness to the taxpayers in the different years.

TABLE 18J

THE PER CAPITA NET VALUE PRODUCT AT PRICES OF 1913 OF ALL BRANCHES OF GOVERNMENT IN THE CONTINENTAL UNITED STATES

A	B	C	D
Year	Purchasing power of net value product [a] (Millions)	Population of the Continental United States [b] (Thousands)	Per capita purchasing power $\frac{B}{C}$
1909	$1,507	90,370	$17
1910	1,576	92,229	17
1911	1,648	93,811	18
1912	1,726	95,338	18
1913	1,829	97,278	19
1914	1,921	99,194	19
1915	2,010	100,428	20
1916	2,009	101,722	20
1917	2,353	103,059	23
1918	3,419	104,182	33

[a] See Table 18I, Column H.
[b] See Table 2A.

§ 18i. The Share of Government in the National Value Product

One of the most interesting questions to be answered by this study is whether the activities of government are an increasing or diminishing factor in our national life. This query is partially answered by Table 18K. Of course, the very rapid development of governmental activity during the war years can scarcely be assumed to have any significant relationship to the trend under discussion until later developments show whether the encroachments of government upon the former domain of private activity are permanent or transitory.

While it is perfectly clear that there was a sharp increase in the relative activity of government in 1918, it is somewhat doubtful whether there was any real growth in the percentage before that date. The probabilities are, however, that the trend was slightly upward throughout the decade but the movement was certainly not striking enough either to satisfy the proponents of government ownership or greatly to alarm its opponents.

TABLE 18K

THE ESTIMATED SHARE OF GOVERNMENT IN THE NET VALUE PRODUCT OF ALL THE INDUSTRIES OF THE CONTINENTAL UNITED STATES

A	B	C	D
Year	Net value product of all industries [b] (Millions)	Net value product of all branches of government [a] (Millions)	Per cent of value product originating in government activity C B
1909	$28,775	$1,440	5.00
1910	31,766	1,542	4.85
1911	31,188	1,622	5.20
1912	33,554	1,716	5.12
1913	35,580	1,829	5.14
1914	33,936	1,941	5.72
1915	36,109	2,066	5.72
1916	45,418	2,207	4.86
1917	53,860	3,023	5.61
1918	60,366	5,352	8.87

[a] See Table 18H, Column F.
[b] See Vol. I, Table 2.

CHAPTER 19

UNCLASSIFIED INDUSTRIES AND MISCELLANEOUS INCOME

§ 19a. The Field Covered

It is an unfortunate fact that there exists a large section of the industrial field the activities of which are not recorded by the Census Bureau, the Interstate Commerce Commission, or any other Federal agency. State and municipal reports and private investigation give an inkling, but nothing more, concerning the value product in this statistical "no man's land." Wage data, while scattered, are fortunately quite abundant, and the income tax throws some light upon the gains of enterprise and property. These, then, are the chief sources upon which reliance must be placed.

The income derived from this field includes that arising from mercantile operations, both wholesale and retail, from the activities of independent professional men such as physicians and lawyers, from personal service, from the rental of business buildings, and from interest allowance on the value of consumption goods on hand, besides that from numerous minor sources. These items of income are grouped and summarized in the estimates which follow. The figures for the earnings of employees are believed to be reasonably accurate: the remaining estimates may be widely in error.

§ 19b. Number of Persons Occupied in Unclassified Industries

The number of entrepreneurs and employees attached to unclassified industries has been estimated by the simple process of adding up the numbers of each class reported for all of the industries thus far recorded and subtracting the totals thus obtained from the respective total numbers of entrepreneurs and employees estimated as being attached to all industries. In the case of the employees, the number thus arrived at for each year [1] has been multiplied by an estimated percentage of employment, and the resulting products [2] have in turn been multiplied by the average full time wage computed for the unclassified field.

§ 19c. The Earnings of Employees

This average wage is based upon a study of 166 average wage records, some more or less fragmentary, but all of which were estimated or pieced

[1] See Table 19A, Column F.

[2] These products represent the numbers actually working and are entered in Table 19 A, Column B.

out for the entire decade. These separate records have been weighted roughly in proportion to the number of employees in the field which they best typified—the numbers being taken from the Census of Occupations of 1910. Table 19A presents the results of these operations.

TABLE 19A

AN ESTIMATE OF THE NUMBER OF EMPLOYEES IN UNCLASSIFIED INDUSTRIES AND THEIR AVERAGE COMPENSATION FOR SERVICES

A	B	C	D	E	F	G	H	I
Year	Number of employees actually at work [a] (Thousands)	Average full-time annual earnings [a]	Total earnings of employees (Thousands) B × C	Fraction actually working of those attached to industry [b]	Number of employees attached to industry (Thousands) B / E	Average annual earnings of those attached to industry D / F	Index of prices of goods consumed by manual or clerical workers [c]	Purchasing power of average annual earnings G / H
1909..	6,290	$ 777	$4,887	0.92	6,823	$ 716	0.955	$750
1910..	6,830	802	5,478	.93	7,376	743	.978	759
1911..	6,820	806	5,497	.89	7,685	715	.984	727
1912..	7,400	833	6,164	.93	7,980	772	.994	777
1913..	7,620	858	6,538	.91	8,397	779	1.000	779
1914..	7,100	885	6,284	.87	8,183	768	1.01	760
1915..	7,031	904	6,356	.83	8,175	777	1.03	755
1916..	7,477	942	7,043	.92	8,127	867	1.10	788
1917..	7,296	1,012	7,384	.93	7,600	972	1.29	753
1918..	6,008	1,087	6,531	.97	6,194	1,054	1.58	667

[a] For mode of derivation, see text.
[b] See § 2d for method of computation.
[c] U. S. Bureau of Labor Statistics index carried back, by means of a special study; see Table 2C.

It is clear that, in the closing years of the decade, wages and salaries failed to parallel the sharp rise in the price level, the result being that the economic condition of the employees was worse in 1918 than at any other time in the period.

§ 19d. The Effect of the War on the Number of Employees

Another interesting feature of the table is the decided fall in the number of employees occurring in 1918. This fall is in sharp contrast to the rise occurring in most of the other reporting fields and shows where the drain in man power for the army produced its ultimate effect. This is, of course, not at all equivalent to assuming that the army was composed of a larger proportion of men formerly engaged in this rather than in other fields, for there was shifting all along the line until the reduction occurred in the lines of activity least necessary for war purposes.

§ 19e. The Profits of Entrepreneurs

The estimate of the profits of the entrepreneurs in unclassified industries rests almost wholly upon the reports of the Federal Bureau of Internal Revenue for 1916. In their *Statistics of Income* for that year (pages 126 to 137), are given frequency tables of the incomes of persons in different occupations. Those groups belonging in the unclassified field were segregated and summated and the curve derived therefrom was plotted and extended to cover the incomes falling below the taxable limit. The general assumption was made that the net income of entrepreneurs remained somewhat above that for employees at the same relative points on the distribution scale.

An estimate was next made of the fraction of the total income of persons in these selected occupations which was derived from the gains of business or profession, this estimate being also based upon *Statistics of Income.* The total income as computed was multiplied by this fraction in order to arrive at the gains of entrepreneurs in unclassified industries.

Since for other years, the distributions of individual incomes were not reported by occupations, it was necessary to make rough estimates therefor based upon variables which it was believed might prove representative; namely bank clearings, profits in other industrial fields, and the net gains of corporations as shown by the income-tax reports. Owing to the complexity of the procedure adopted, it seems impracticable to do more here than to present the final results of the study. The lack of satisfactory data necessarily gives rise to the possibility of great error, hence the results obtained cannot be considered as anything more than very rough approximations to the truth.

The statistics of the earnings of corporations engaged in business in this field are, for recent years, more complete than are those of the incomes of individual entrepreneurs. Although this group cannot be accurately segregated in 1917 and 1918, it seems quite certain that the figures here presented for the three years beginning with 1916 are accurate enough for practical purposes. Before the first date mentioned, however, it has been necessary to make estimates by using as an index of change a combination of bank clearings and total profits in other recorded lines of industry.

§ 19f. Rents and Royalties

In the *Statistics of Income* published each year by the Bureau of Internal Revenue, appears a record of the total rents and royalties received by members of each income class. These quantities have been plotted as curves and the curves have been extended to take in the income classes below the taxable limit. Since the amount of contract rent received by the poorer

classes of the population is presumably small, it seems probable that the error involved in the method used is relatively unimportant. There is greater danger that a large fraction of rents received are not reported to the income tax authorities. Should such be the case, the estimates presented would of course be too low, as no adjustment has been made for non-reporting.

Contract rents and royalties have already been calculated for a number of industries. These amounts have been added together and their sum has been subtracted from the estimated total of the same for the entire country, the remainder being assumed to represent the net rents and royalties received from unclassified industries.

Before 1916, the income-tax reports furnished no information concerning rents and royalties. For the earlier years, therefore, it was assumed that the non-reported rents varied in approximately the same manner as did those in the reporting industries.

The results of these assumptions concerning the aggregate of rents appear in Table 19B.

TABLE 19B

AN ESTIMATE OF THE TOTAL OF CONTRACT RENTS IN UNCLASSIFIED FIELDS OF INDUSTRY

A	B	C	D
Year	Total contract rents in the United States [a] (Millions)	Contract rents accounted for in all industries having records of rents [a] (Millions)	Contract rents not otherwise accounted for (Millions) B — C
1909	$ 668	$ 550	$118
1910	705	580	125
1911	732	601	131
1912	776	637	139
1913	817	669	148
1914	833	681	152
1915	883	720	163
1916	1,000	813	187
1917	1,150	932	219
1918	1,290	1,027	263

[a] For derivation, see the text.

§ 19g. The Total Share of Enterprise and Property

Table 19C summarizes the different items entering into the share of enterprise and property in the unclassified field and reduces the total to

terms of purchasing power. The index used for the last mentioned purpose is a combination of the indices of prices of goods used by the workers and by consumers of moderate means. This index is chosen because many of the small proprietors have no more income than the well-to-do workers; hence their type of consumption is probably essentially similar to that of employees.

TABLE 19C

AN ESTIMATE OF THE SHARE OF THE ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE NET VALUE PRODUCT OF UNCLASSIFIED INDUSTRIES

A	B	C	D	E	F	G
Year	Profits accrued plus interest.[a] Paid out by		Contract rents and royalties [b] (Millions)	Total share of entrepreneurs and other property owners (Millions) B + C + D	Index of prices of goods consumed [c]	Purchasing power of share of entrepreneurs and other property owners (Millions) E ÷ F
	Corporations [b] (Millions)	Private entrepreneurs [b] (Millions)				
1909.....	$ 848	$2,232	$118	$3,198	.955	$3,348
1910.....	919	2,360	125	3,404	.977	3,484
1911.....	862	2,395	131	3,388	.984	3,443
1912.....	966	2,582	139	3,687	.996	3,702
1913.....	1,008	2,652	148	3,808	1.000	3,808
1914.....	909	2,583	152	3,644	1.011	3,604
1915.....	1,014	2,723	163	3,899	1.016	3,838
1916.....	1,569	3,609	187	5,364	1.094	4,903
1917.....	1,834	4,601	219	6,654	1.271	5,235
1918.....	1,047	4,601	263	5,911	1.514	3,904

[a] Evidence from the income tax reports indicates that total bond or mortgage interest is only about one-hundredth as great as profits.

[b] For mode of estimation, see text.

[c] Average of indices representing respectively the consumption of working people and of families spending $5,000 each annually for consumption goods.

The chief points of importance brought out by Table 19C are: first, that contract rents form a relatively small part of the total; second, that private and not corporate entrepreneurs dominate this field; and third, that 1916 and 1917 were extremely profitable years for the entrepreneurs here as well as elsewhere.

§ 19h. Other Classes of Miscellaneous Income

There is a very considerable aggregate of income which forms part of the total for the nation but which cannot legitimately be considered as

[illegible] discussed. This income [illegible]

[illegible]

[illegible] consumption goods on [illegible]

[illegible]

[illegible] the keeping of poultry and [illegible]

13. The Net Rental Value of Owned Homes

[illegible] by following [illegible] $50 in 1913 [illegible] and [illegible] Since farm homes [illegible] estimate the [illegible] The figures [illegible] of the *Population* [illegible] of these homes were occupied [illegible] would house 19,830,000 [illegible] in proportion to the [illegible] This fraction of [illegible] on the basis of [illegible] multiplied by the [illegible] The results and some of the processes [illegible]

14. Interest on the Value of Direct Goods

[illegible] investments upon [illegible] income to the [illegible] consumption goods in [illegible] the same category, the [illegible] aggregate of value [illegible] they are a type of [illegible] while automo- [illegible] and very com- [illegible] the hands of the [illegible] consumption goods [illegible] information is [illegible] The nearest feasi-

[illegible] should be omitted [illegible] States was about [illegible] the average in- [illegible] the gross rental [illegible] the net rental [illegible] $50, or $50.

TABLE 19D

THE ESTIMATED NET RENTAL VALUE OF THOSE HOMES IN CITIES AND VILLAGES OF THE CONTINENTAL UNITED STATES WHICH ARE OCCUPIED BY THE OWNERS

A	B	C	D	E	F
Year	Number of urban families residing in owned homes (Thousands)	Population of United States not residing on farms [b] (Thousands)	Population of cities and villages residing in owned homes [c] (Thousands)	Net rental value per person of homes owned [c]	Total net rental value of owned homes (Millions) D × E
1909..		61,830	19,230	$48.50	$ 933
1910..	4,411 [a]	63,629	19,820	50.50	1,001
1911..		65,211	20,290	50.50	1,025
1912..		66,748	20,780	50.00	1,039
1913..		68,698	21,390	50.00	1,069
1914..		70,654	22,000	50.00	1,100
1915..		71,928	22,360	50.50	1,129
1916		73,262	22,800	51.00	1,163
1917..		74,639	23,230	50.50	1,173
1918..		75,792	23,590	52.50	1,238

[a] Derived from the *Census of Population* for 1910, Vol. I, p. 1294, by apportioning the unreported and encumbered homes—the latter on the basis of full ownership.
[b] Estimated from the Census.
[c] For mode of derivation, see the text.

ble approach to such a figure is arrived at by applying an assumed interest rate to the value as reported by the *Census of Wealth, Debt, and Taxation* and then proceeding to make estimates for other years based upon the variations in an index representing a product of the prices of durable consumption goods and the population of the United States. Such an estimate is made in Table 19E.

§ 19k. Profits from Cow-Keeping

The basis for computing the profits from cows kept in cities and villages is very slender but this is not a matter of very great moment since the total is relatively unimportant.

Once in a decade, the Census of Agriculture records the number of milk cows not on farms. It was found by the United States Public Health Service through a special study that the average profit obtained from keeping a cow in South Carolina was about $75 per year. This amount has been varied from year to year according to an index number of the price of dairy products and then, in order to obtain the total entered in Table 19F,

TABLE 19E

AN ESTIMATE OF THE INTEREST ON THE INVESTMENT IN CONSUMPTION GOODS OTHER THAN RESIDENCES

A	B	C	D	E	F	G	H
Year	Index of price of durable consumption goods[a]	Population of the U. S. in thousands[c]	Index of total value of consumption goods (Thousands) B × C	Value of consumption goods, (Census figures (Millions)	Ratio of E to D	Value of consumption goods (Millions) D × F	Interest[e] on investment in consumption goods (Millions) .06 G
1904...	.986	82,467[b]	81,310	$ 8,250[d]	101.5[f]	$ 8,250	$ 496
1909...	1.044	90,370	94,350		119.8[g]	11,300	678
1910...	1.050	92,229	96,840		121.9[g]	11,800	708
1911...	1.056	93,811	99,060		124.8[g]	12,360	742
1912...	1.029	95,338	98,100	12,758[d]	130.1[f]	12,758	765
1913...	.993	97,278	96,600		133.8[g]	12,920	775
1914...	.987	99,194	97,900		136.2[g]	13,330	800
1915...	.980	100,428	98,420		140.9[g]	13,870	832
1916...	1.059	101,722	107,720		145.0[g]	15,620	937
1917...	1.143	103,059	117,800		147.6[g]	17,390	1,043
1918...	1.362	104,182	141,900		149.3[g]	21,190	1,271
1919...	1.642	104,847	172,160		156.0[g]	26,860	1,612

[a] Weighted as follows: Furniture 4, Clothing 3, Automobiles 3.
[b] *Statistical Abstract of the United States*, 1918, p. 776.
[c] Estimated for the intercensal years by means of a special study; see Table 2A.
[d] *Census of Wealth, Debt, and Taxation*, 1913, Vol. I, p. 17.
[e] Rate arbitrarily assumed to be 6 per cent throughout, since the real object sought is to measure rents, not interest, and the relationship between rents, interest, and values is not known for the various years.
[f] Computed by division.
[g] Interpolated along a smooth curve.

this estimated average profit has been multiplied by the number of cows kept.

§ 191. Profits from Raising Poultry and Gardens

The estimated profit on poultry and gardens is only a refined guess. The starting point is an estimate for 1909 of $70,300,000 which is based on the idea that the average family garden and poultry supply gives a net gain of $25.00 per year and that the fractions of families having such income were as follows for cities of the sizes stated:—

Population of city or village	Fraction of families
Under 10,000	0.50
10,000 to 50,000	.33
50,000 to 100,000	.25
100,000 to 250,000	.12
250,000 and over	.06

An index has been computed, based on the product of the population of

cities and villages of less than 250,000 inhabitants and the average price of foods and farm products. The estimated value has then been varied from year to year in proportion to the movements of this index. The resulting amounts are entered in Table 19F.

TABLE 19F

A SUMMARY OF THE ESTIMATES OF INCOME FROM MISCELLANEOUS SOURCES

Year	Millions of dollars				
	Total	Rental value of owned urban homes [a]	Interest on value of other consumption goods [b]	Profits from keeping cows in cities and villages [c]	Profits from gardening and poultry raising in cities and villages [c]
1909	$1,740	$ 933	$ 678	$ 59	$ 70
1910	1,840	1,001	708	60	71
1911	1,901	1,025	742	61	73
1912	1,946	1,039	765	60	82
1913	1,986	1,069	775	61	81
1914	2,048	1,100	800	62	86
1915	2,112	1,129	832	62	89
1916	2,277	1,163	937	69	108
1917	2,468	1,173	1,043	90	162
1918	2,876	1,238	1,271	114	253
1919	3,308	1,356	1,612	129	211

[a] See Table 19D, Column F.
[b] See Table 19E, Column H.
[c] For mode of derivation, see the text.

§ 19m. The Division of the Net Value Product

A statement of the fraction of all unclassified and miscellaneous income paid out as wages and salaries is not very significant because of the fact that no inconsiderable part of the "miscellaneous income" accrues to persons attached to already recorded industrial fields. For example, persons engaged in manufacturing, transportation, or mining may receive income from the rental value of the homes they occupy or from other consumption goods owned or they may obtain profit by raising poultry or gardens in their spare time. For these reasons, it seems best to present two columns for the per cent of the income going to the employees in the form of wages and salaries. The last one has significance only as a balance item. The fact that it is so much lower than the preceding column helps to show why the per cent for all industries runs so much lower than does the average of the per cents for manufacturing, mining, etc.

Column F represents the industries in this group and is entirely comparable with similar figures for other industrial fields. According to these figures, employees in unclassified industries receive in the form of salaries and wages about the same fraction of the net value product that prevails on the average in the other industrial fields. The percentage has, however, shown a decline since 1916, a phenomenon which is not characteristic of most of the other lines studied.

Owing to the heterogeneous nature of the items involved, it seems useless to attempt to carry further the analysis of the data pertaining to unclassified industries and miscellaneous income.

TABLE 19G

THE ESTIMATED NET INCOME ARISING FROM UNCLASSIFIED INDUSTRIES AND MISCELLANEOUS SOURCES AND THE FRACTION THEREOF PAID OUT AS WAGES AND SALARIES

A	B	C	D	E	F	G
Year	Total income for these fields (Millions)	Earnings of employees in unclassified industries [a] (Millions)	Profits and contract rents in unclassified industries [b] (Millions)	Income from miscellaneous sources [c] (Millions)	Per cent of total income paid to employees as wages and salaries from: Unclassified industries $\frac{C}{C+D}$	Per cent of total income paid to employees as wages and salaries from: The total income $C \div B$
1909 ...	$ 9,824	$4,887	$3,198	$1,740	60.4	49.7
1910 ...	10,722	5,478	3,404	1,840	61.7	51.1
1911 ...	10,786	5,497	3,388	1,901	61.9	51.0
1912 ...	11,796	6,164	3,687	1,946	62.6	52.3
1913 ...	12,332	6,538	3,808	1,986	63.2	53.0
1914 ...	11,975	6,284	3,644	2,048	63.3	52.5
1915 ...	12,367	6,356	3,899	2,112	62.0	51.4
1916 ...	14,685	7,043	5,364	2,277	56.8	48.0
1917 ...	16,506	7,384	6,654	2,468	52.6	44.7
1918 ...	15,318	6,531	5,911	2,876	52.5	42.6

[a] See Table 19A, Column D.
[b] See Table 19C, Column E.
[c] See Table 19F, Total.

CHAPTER 20

SUMMARY OF PART I

§ 20a. The Average Income per Ammain

It has long been customary, when comparing different groups of persons, to use the per capita income of each group as a measure of its relative economic welfare. This measure is, on the whole, sufficiently accurate when applied to large groups containing single persons and families of all sizes. It is, however, nearly valueless if the comparison is between classes determined by age, sex, marital condition, or social status. In such classifications, the fact that persons differing in sex and age require very different incomes in order to live in the same degree of comfort becomes of paramount importance. To give validity to comparisons in such instances it is necessary first to reduce all members of the population to homogeneous units based upon the relative need for commodities. Such units are termed ammains. An ammain is defined as *a gross demand for articles of consumption having a total money value equal to that demanded by the average male in that class at the age when his total requirements for expense of maintenance reach a maximum.* The number of ammains in each group of persons can be approximated by aid of tables which are available.[1] Having ascertained the number of ammains it is only necessary to divide the total income of the group by this number to ascertain the average income per ammain for the group. There seems to be little doubt that the income per ammain is the best unit yet devised for use in comparing the relative economic status of persons and families in different groups of the population.

Inasmuch as we do not know the exact income of the nation and since the age and sex composition of the population is recorded only once in ten years, it is impossible to compute the average income per ammain for the entire country with any high degree of accuracy. Since, however, the age and sex distribution of the population of a great nation changes very slowly, it is possible to state the average income per ammain with nearly as high a degree of accuracy as that attainable in the estimate of the total national income. It may often be desirable to compare the income per ammain of different groups of persons with the average for the entire country. In order to facilitate comparisons of this type Table 20A is presented. It gives an estimate for each year of the number of ammains and the average income per ammain for the entire population of the Continental United States.

[1] See the *Quarterly Publications of the American Statistical Association*, Sept., 1921, p. 854, the *Journal of Political Economy*, July, 1921, or the *United States Public Health Reports* for Nov. 26, 1920.

TABLE 20A

THE AVERAGE INCOME PER AMMAIN OF THE POPULATION OF THE CONTINENTAL UNITED STATES

Calendar year	Total income in dollars of		Number of ammains in the entire population (Thousands)	Income per ammain in dollars of	
	The given year (Millions)	1913 value (Millions)		The given year	1913 value
1909	$28,775	$30,101	62,340	$462	$483
1910	31,766	32,477	63,627	499	510
1911	31,188	31,686	64,720	482	490
1912	33,554	33,730	65,763	510	513
1913	35,580	35,580	67,104	530	530
1914	33,936	33,596	68,430	496	491
1915	36,109	35,335	69,290	521	510
1916	45,418	41,265	70,175	647	588
1917	53,860	41,910	71,100	757	589
1918	60,366	39,112	71,875	840	544

§ 20b. Business Savings

Table 20B summarizes the estimates of business savings presented separately in the reports for certain industries. In general, business savings, as recorded, represent increases during the period in the total net worth of all enterprises in the field. The figures for "Agriculture," however, represent only the changes from year to year in the value of tangible agricultural property. Increases in the total value of farm land due to a rise in the average price per acre are, however, excluded. Changes in the value of the farmers' bank accounts and investments in properties outside the agricultural field are not included because the necessary data are lacking. The farmers' personal savings and business savings are indistinguishable, hence no effort has been made to make any artificial division of the savings into these two categories. For the reasons just cited, agricultural savings are not entirely comparable with the business savings of other fields.

§ 20c. Miscellaneous Summary Tables Not Appearing in Volume I

In Table 20H, the amounts saved by reporting non-agricultural business enterprises are recorded in Column F. Now, in many industries, records of savings are not available, but it is nevertheless desirable, if possible, to make a rough estimate of the savings of all business enterprises in the nation. The estimate here presented is based upon the assumption that the non-reported and reported industries have each saved the same fraction of the income available for distribution to entrepreneurs and other property owners. In making this calculation, "Government" has not been considered a business enterprise and "Miscellaneous Income" has not been considered as business income because such a large share of it accrues to individuals as private income. After estimating the business savings for all non-agricultural industries,[1] the increase in the value of farm property other than land has been added in order that the total may roughly represent the business savings of the entire United States.

The estimate thus arrived at indicates that the business enterprises of the nation normally lay aside from 5 to 10 per cent of the national income before distributing the remainder of their net receipts to the personal accounts of their owners in the form of dividends (or other profits), rent, or interest. The amount of this type of saving increases sharply in years of business prosperity and falls off again greatly in times of depression. During the decade, business enterprises apparently saved about 30 per cent of the aggregate amount which they might have disbursed to entrepreneurs and other property owners. Doubtless no inconsiderable share of the disbursed income is also saved by the recipients, but the amount so laid aside is purely a matter of conjecture. The volume of business savings alone is however so large as to demand the careful consideration of all persons interested in questions of distribution of income.

[1] Includes "unclassified" industries.

TABLE 20C

AN APPROXIMATION TO THE TOTAL AMOUNTS DISBURSED TO ENTREPRENEURS AND OTHER OWNERS OF PROPERTY DEVOTED TO THE INDUSTRY [d] IN THOSE INDUSTRIAL FIELDS IN WHICH IT IS POSSIBLE TO MAKE REASONABLY DEPENDABLE ESTIMATES

	Industry	Millions of dollars paid in the year									
		1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
In Money at Value in Given Year	Agriculture	4,277	4,232	3,762	4,099	4,375	4,246	4,893	6,455	8,909	10,571
	Mining [a]	207	219	225	251	275	249	276	392	537	512
	Factories [b]	1,185	1,319	1,222	1,309	1,455	1,410	1,197	1,567	2,427	2,078
	Railways [c]	574	639	671	691	726	710	688	718	713	691
	Pullman Co.	8	9	9	9	9	9	9	9	9	9
	Express	19	22	9	6	5	4	6	15	4	3
	Street and Electric Railways	141	149	161	172	182	183	187	192	197	136
	Electric Light and Power	58	65	73	81	86	97	103	112	123	140
	Telegraphs	9	9	9	10	10	10	11	11	12	13
	Telephones	43	45	48	53	56	58	60	63	68	73
	Transportation by Water	27	36	32	32	32	35	34	39	66	56
	Banking	222	267	272	280	293	289	280	266	279	286
	Government [e]	96	121	136	142	151	164	180	190	277	510
	Total of Above	6,866	7,132	6,629	7,135	7,655	7,464	7,924	10,029	13,621	15,078

TABLE 20C—*Continued*

Value of Consumption Goods Purchasable at prices of 1913	Agriculture	4,511	4,319	3,762	4,118	4,375	4,186	4,792	5,910	6,867	6,759
	Mining [a]	214	222	227	251	275	247	276	363	438	364
	Factories [b]	1,218	1,335	1,228	1,309	1,455	1,396	1,202	1,458	1,853	1,524
	Railways [c]	590	647	674	691	726	703	691	668	595	506
	Pullman Co	8	9	9	9	9	9	9	9	8	7
	Express	19	22	9	6	5	4	6	14	3	2
	Street and Electric Railways	145	151	161	172	182	181	188	179	164	99
	Electric Light and Power	60	66	74	81	86	96	103	103	100	100
	Telegraphs	9	10	10	10	10	10	11	10	10	9
	Telephones	44	46	49	53	56	58	60	58	57	53
	Transportation by Water	28	36	32	32	32	34	34	36	54	39
	Banking	233	271	276	281	293	287	275	243	223	188
	Government [e]	100	123	138	142	151	162	179	175	224	354
	Total of Above	7,179	7,257	6,649	7,155	7,655	7,373	7,826	9,226	10,596	10,004

[a] Includes quarries and oil wells.
[b] Field included in principal tables of *Census of Manufactures*.
[c] Includes switching and terminal companies.
[d] Includes trivial amounts received by unreliable debtors (recorded as uncollectible revenues).
[e] Includes all branches of government.

TABLE 20C

AN APPROXIMATION TO THE TOTAL AMOUNTS DISBURSED TO ENTREPRENEURS AND OTHER OWNERS OF PROPERTY DEVOTED TO THE INDUSTRY [d] IN THOSE INDUSTRIAL FIELDS IN WHICH IT IS POSSIBLE TO MAKE REASONABLY DEPENDABLE ESTIMATES

	Industry	Millions of dollars paid in the year									
		1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
In Money at Value in Given Year	Agriculture	4,277	4,232	3,762	4,099	4,375	4,246	4,893	6,455	8,909	10,571
	Mining [a]	207	219	225	251	275	249	276	392	537	512
	Factories [b]	1,185	1,319	1,222	1,309	1,455	1,410	1,197	1,567	2,427	2,078
	Railways [c]	574	639	671	691	726	710	688	718	713	691
	Pullman Co.	8	9	9	9	9	9	9	9	9	9
	Express	19	22	9	6	5	4	6	15	4	3
	Street and Electric Railways	141	149	161	172	182	183	187	192	197	136
	Electric Light and Power	58	65	73	81	86	97	103	112	123	140
	Telegraphs	9	9	9	10	10	10	11	11	12	13
	Telephones	43	45	48	53	56	58	60	63	68	73
	Transportation by Water	27	36	32	32	32	35	34	39	66	56
	Banking	222	267	272	280	293	289	280	266	279	286
	Government [e]	96	121	136	142	151	164	180	190	277	510
	Total of Above	6,866	7,132	6,629	7,135	7,655	7,464	7,924	10,029	13,621	15,078

TABLE 20C—*Continued*

Value of Consumption Goods Purchasable at prices of 1913	Agriculture	4,511	4,319	3,762	4,118	4,375	4,186	4,792	5,910	6,867	6,759
	Mining [a]	214	222	227	251	275	247	276	363	438	364
	Factories [b]	1,218	1,335	1,228	1,309	1,455	1,396	1,202	1,458	1,853	1,524
	Railways [c]	590	647	674	691	726	703	691	668	595	506
	Pullman Co	8	9	9	9	9	9	9	9	8	7
	Express	19	22	9	6	5	4	6	14	3	2
	Street and Electric Railways	145	151	161	172	182	181	188	179	164	99
	Electric Light and Power	60	66	74	81	86	96	103	103	100	100
	Telegraphs	9	10	10	10	10	10	11	10	10	9
	Telephones	44	46	49	53	56	58	60	58	57	53
	Transportation by Water	28	36	32	32	32	34	34	36	54	39
	Banking	233	271	276	281	293	287	275	243	223	188
	Government [e]	100	123	138	142	151	162	179	175	224	354
	Total of Above	7,179	7,257	6,649	7,155	7,655	7,373	7,826	9,226	10,596	10,004

[a] Includes quarries and oil wells.
[b] Field included in principal tables of *Census of Manufactures*.
[c] Includes switching and terminal companies.
[d] Includes trivial amounts received by unreliable debtors (recorded as uncollectible revenues).
[e] Includes all branches of government.

TABLE 20D

THE TOTAL SHARE OF THE NET VALUE PRODUCT GOING TO ENTREPRENEURS, INVESTORS, AND OTHER OWNERS OF PROPERTY USED IN THE INDUSTRY [a]

Includes Business Savings

	Industry	Millions of dollars in the year									
		1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
In Money at Value in Given Year	All Industries [f]	13,520	15,196	14,383	15,137	15,778	15,384	16,754	21,800	26,005	27,701
	Agriculture	3,969	5,012	4,612	4,525	5,101	5,273	5,590	6,401	8,661	11,432
	Mining [b]	262	253	260	316	317	284	370	602	684	591
	Factories [c]	1,697	1,918	1,498	1,834	2,030	1,548	1,936	3,886	4,330	3,503
	Construction	767	661	631	667	393	481	486	581	294	317
	Other Hand Trades	349	376	399	425	447	462	474	558	706	800
	Railways [d]	752	810	770	779	747	693	859	1,032	994	807
	Pullman Co	17	17	12	12	13	12	12	12	13	10
	Express	16	15	11	8	5	4	9	11	2	—14
	Street and Electric Railways	155	166	177	189	192	196	199	202	205	124
	Electric Light and Power	71	83	91	98	106	110	126	144	148	160
	Telegraphs	14	14	12	10	10	11	18	19	21	18
	Telephones	65	66	65	71	71	71	77	87	83	86
	Transportation by Water	34	61	41	56	54	34	58	106	88	85
	Banking	319	382	370	372	348	351	349	389	431	485
	Government [e]	96	121	136	142	151	164	180	190	277	510
	Unclassified Industries	3,198	3,404	3,388	3,687	3,808	3,644	3,899	5,304	6,054	5,911
	Miscellaneous Income	1,740	1,840	1,901	1,946	1,985	2,048	2,112	2,277	2,408	2,876

TABLE 20D—*Continued*

Values of Goods Purchasable at prices of 1913	All Industries [f]	14,128	15,535	14,607	15,202	15,778	15,227	16,544	19,849	20,364	18,494
	Agriculture	4,156	5,124	4,687	4,547	5,101	5,215	5,464	5,835	6,766	7,390
	Mining [b]	273	259	264	317	317	282	371	538	538	417
	Factories [c]	1,770	1,963	1,520	1,843	2,030	1,539	1,947	3,402	3,290	2,474
	Construction	802	676	641	668	393	475	485	534	225	219
	Other Hand Trades	366	384	405	427	447	457	464	509	552	578
	Railways [d]	781	826	780	781	747	686	864	931	786	584
	Pullman Co	18	17	12	12	13	12	12	11	10	7
	Express	16	15	11	8	5	4	9	11	2	—6
	Street and Electric Railways	160	169	179	189	192	195	200	187	170	91
	Electric Light and Power	74	85	92	99	106	108	126	133	120	114
	Telegraphs	15	14	12	10	10	11	17	16	16	13
	Telephones	69	69	68	71	71	71	77	76	67	62
	Transportation by Water	36	63	42	57	54	33	59	92	69	59
	Banking	331	388	389	372	348	348	343	343	310	287
	Government [e]	100	123	138	142	151	162	179	175	224	354
	Unclassified Industries	3,348	3,484	3,443	3,709	3,808	3,604	3,838	4,903	5,235	3,904
	Miscellaneous Income	1,811	1,876	1,924	1,950	1,985	2,026	2,090	2,153	1,972	1,946

[a] Includes small amounts of goods obtained by unreliable debtors (recorded as uncollectible revenues).
[b] Includes mines, quarries, and oil wells.
[c] The field covered by the principal tables in the *Census of Manufactures*.
[d] Includes switching and terminal companies.
[e] Includes all branches of government—national, state, and local.
[f] Computed from data carried to more places, hence slightly different from the totals of the items recorded below.

TABLE 20E

AN ESTIMATE OF THE TOTAL AMOUNT OF WAGES AND SALARIES[a] PAID BY THE VARIOUS BRANCHES OF INDUSTRY IN THE CONTINENTAL UNITED STATES

Industry	Millions of dollars paid in the year									
	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
All industries	14,960	16,265	16,498	18,092	19,450	18,216	19,019	23,175	27,365	32,076
Agriculture	717	716	756	761	786	767	786	848	1,059	1,251
Mining[b]	612	676	698	752	832	718	727	894	1,112	1,354
Factories[c]	4,366	4,790	4,805	5,310	5,890	5,366	5,892	8,442	10,530	12,410
Construction	1,192	1,146	1,104	1,218	1,276	932	927	1,066	973	964
Other Hand Trades	295	327	339	362	391	404	425	478	603	780
Railways[d]	1,092	1,205	1,261	1,350	1,416	1,310	1,322	1,547	1,968	2,741
Pullman Co.	8	9	9	10	14	14	13	14	15	20
Express	36	39	42	46	47	44	45	52	64	82
Street and Electric Railways	171	181	191	201	214	224	222	242	267	314
Electric Light and Power	40	47	50	56	59	62	63	71	86	97
Telegraphs	18	19	22	26	27	26	26	31	40	49
Telephones	81	91	103	112	125	128	126	145	170	190
Transportation by water	173	182	184	197	204	202	222	274	334	421
Banking	115	123	137	149	161	164	183	214	230	281
Government[e]	1,157	1,236	1,300	1,378	1,470	1,571	1,684	1,814	2,530	4,591
Unclassified industries	4,887	5,478	5,497	6,164	6,538	6,284	6,356	7,043	7,384	6,531

[a] Includes subsistence furnished to employees, but excludes pensions, compensation for injuries, commissions, tips, and payments for work done under contract.
[b] Includes quarries and oil wells.
[c] The field covered by the principal tables in the Census of Manufactures.
[d] Includes switching and terminal companies.
[e] Includes all branches of government—national, state and local.

TABLE 20F

AN ESTIMATE OF THE TOTAL DISBURSEMENTS TO PAST OR PRESENT EMPLOYEES IN THE FORM OF WAGES,[a] SALARIES,[a] PENSIONS, COMPENSATION FOR INJURIES, AND PAYMENTS FOR WORK DONE UNDER CONTRACT

Industry	Millions of dollars paid in the year									
	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
All industries	15,255	16,570	16,805	18,417	19,801	18,552	19,355	23,558	27,795	32,575
Agriculture	717	716	756	761	786	767	786	848	1,059	1,251
Mining[b]	643	711	733	790	874	755	764	939	1,169	1,422
Factories[c]	4,410	4,838	4,852	5,361	5,946	5,416	5,945	8,517	10,621	12,515
Construction	1,192	1,146	1,104	1,218	1,276	932	927	1,066	973	964
Other Hand Trades	306	339	351	375	404	418	439	496	628	814
Railways[d]	1,105	1,219	1,277	1,367	1,434	1,328	1,339	1,566	1,990	2,763
Pullman Co.	10	11	12	13	17	17	16	17	19	24
Express	43	47	51	54	55	52	52	61	74	93
Street and Electric Railways	171	181	191	201	214	224	222	242	267	314
Electric Light and Power	40	47	50	56	59	62	63	71	86	97
Telegraphs	18	19	22	26	27	26	26	32	40	49
Telephones	81	92	103	113	126	129	128	154	173	194
Transportation by Water	173	182	184	197	204	202	222	274	334	421
Banking	115	123	137	149	161	164	183	214	230	281
Government[e]	1,343	1,421	1,486	1,574	1,678	1,777	1,886	2,017	2,746	4,842
Unclassified industries	4,887	5,478	5,497	6,164	6,538	6,284	6,356	7,043	7,384	6,531

[a] Includes subsistence furnished to employees.
[b] Includes quarries and oil wells.
[c] The field covered by the principal tables in the *Census of Manufactures*.
[d] Includes switching and terminal companies.
[e] Includes all branches of government—national, state, and local.

TABLE 20G

AN ESTIMATE OF THE NET VALUE PRODUCT OF EACH OF THE LEADING BRANCHES OF INDUSTRY

	Industry	Millions of dollars in the year									
		1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
In Money at Value of Given Year	All Industries[a]	28,775	31,766	31,188	33,554	35,580	33,936	36,109	45,418	53,860	60,366
	Agriculture	4,686	5,728	5,368	5,286	5,887	6,040	6,376	7,249	9,720	12,682
	Mining[b]	904	964	993	1,106	1,191	1,039	1,133	1,541	1,853	2,013
	Factories[c]	6,107	6,756	6,350	7,195	7,976	6,964	7,881	12,404	14,957	16,018
	Construction	1,959	1,906	1,734	1,885	1,669	1,413	1,413	1,647	1,267	1,280
	Other Hand Trades	656	715	750	800	852	879	913	1,054	1,334	1,704
	Railways[d]	1,856	2,029	2,047	2,146	2,181	2,021	2,199	2,598	2,984	3,570
	Pullman Co	28	28	23	25	30	29	28	29	32	34
	Express	59	62	62	62	60	55	61	72	77	80
	Street and Electric Railways	326	347	368	390	406	420	421	444	472	437
	Electric Light and Power	111	129	141	154	165	172	190	215	234	257
	Telegraphs	31	33	34	36	38	38	44	50	62	67
	Telephones	146	158	169	184	197	200	205	240	256	280
	Transportation by Water	208	243	226	253	258	236	280	379	442	506
	Banking	434	504	516	521	509	515	532	604	661	767
	Government[e]	1,440	1,542	1,622	1,716	1,829	1,941	2,066	2,207	3,023	5,352
	Unclassified Industries	8,085	8,882	8,885	9,851	10,346	9,928	10,255	12,407	14,038	12,442
	Miscellaneous Income	1,740	1,840	1,901	1,946	1,986	2,048	2,112	2,277	2,468	2,876

TABLE 20G—*Continued*

Value Products at Prices of 1913	All Industries [a]	30,101	32,477	31,685	33,730	35,580	33,595	35,335	41,265	41,910	39,112
	Agriculture	4,907	5,856	5,455	5,313	5,887	5,974	6,227	6,606	7,587	8,181
	Mining [b]	946	985	1,009	1,111	1,191	1,030	1,112	1,392	1,444	1,317
	Factories [c]	6,387	6,910	6,451	7,236	7,976	6,901	7,719	11,144	11,523	10,395
	Construction	2,051	1,848	1,762	1,893	1,669	1,397	1,385	1,503	989	829
	Other Hand Trades	686	731	762	804	852	870	891	960	1,039	1,093
	Railways [d]	1,938	2,073	2,077	2,155	2,181	2,000	2,164	2,355	2,329	2,333
	Pullman Co.	29	29	24	25	30	28	28	26	25	23
	Express	62	63	63	63	60	55	60	66	60	53
	Street and Electric Railways	339	354	373	391	406	416	416	407	377	290
	Electric Light and Power	116	132	143	155	165	169	188	197	187	175
	Telegraphs	33	34	34	36	38	37	43	45	48	44
	Telephones	154	163	172	185	197	198	201	216	201	185
	Transportation by Water	217	249	230	255	258	233	274	341	328	326
	Banking	452	513	528	522	509	511	521	537	488	465
	Government [e]	1,507	1,576	1,648	1,726	1,829	1,921	2,010	2,009	2,353	3,419
	Unclassified Industries	8,465	9,085	9,029	9,910	10,346	9,826	10,009	11,306	10,959	8,038
	Miscellaneous Income	1,811	1,876	1,924	1,950	1,985	2,026	2,090	2,153	1,972	1,946

[a] Computed from data carried to more places, hence slightly different from the totals of the items recorded below.
[b] Includes mines, quarries, and oil wells.
[c] The field covered by the principal tables in the *Census of Manufactures*.
[d] Includes switching and terminal companies.
[e] Includes all branches of government—national, state, and local.

TABLE 20H

AN ESTIMATE OF THE TOTAL SAVINGS MADE BY BUSINESS ENTERPRISES IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I
		Share of entrepreneurs and other property owners in non-agricultural [a] industries						
	Calendar year	Industries recording business savings (Millions)	All such industries (Millions)	Ratio of D to C	Business savings in non-agricultural [a] industries for which records are available (Millions)	Estimated business savings of all non-agricultural [a] industries (Millions) E × F	Agricultural savings [b] (Millions)	Estimated total business savings [a] (Millions) G + H
At Price Level at Given Date	1909	$3,401	$ 7,715	2.2686	$ 907	$2,057	$ —308	$1,750
	1910	3,784	8,224	2.1738	1,006	2,186	780	2,966
	1911	3,317	7,734	2.3322	584	1,363	850	2,213
	1912	3,746	8,524	2.2760	852	1,939	426	2,365
	1913	3,892	8,540	2.1942	764	1,676	726	2,402
	1914	3,313	7,899	2.3843	257	612	1,027	1,639
	1915	4,013	8,873	2.2110	1,163	2,571	697	3,268
	1916	6,488	12,992	2.0024	3,106	6,220	—53	6,167
	1917	7,213	14,660	2.0328	2,779	5,649	—248	5,401
	1918	5,856	12,973	2.2155	1,854	4,108	860	4,969
At Price Level of 1913	1909	3,545	8,061	2.2742	976	2,218	—355	1,863
	1910	3,867	8,412	2.1752	1,052	2,289	805	3,094
	1911	3,369	7,858	2.3329	619	1,444	925	2,369
	1912	3,759	8,563	2.2780	864	1,939	429	2,398
	1913	3,892	8,540	2.1942	764	1,676	726	2,402
	1914	3,289	7,825	2.3794	264	628	1,028	1,656
	1915	4,023	8,811	2.1900	1,169	2,560	672	3,232
	1916	5,739	11,685	2.0362	2,597	5,289	—75	5,214
	1917	5,379	10,401	1.9339	1,872	3,621	—101	3,520
	1918	4,102	8,803	2.1941	1,209	2,654	631	3,285

[a] Miscellaneous income is, for this purpose, not considered industrial and hence is excluded as is likewise government income. The totals here shown, because they include savings of individual entrepreneurs are necessarily much in excess of the total corporate surplus. (See Chap. 26.)

[b] Not strictly comparable with other business savings,—for reasons see Note E, to Table 20B.

PART II

THE ESTIMATE BY INCOMES RECEIVED

By

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CHAPTER 21

INTRODUCTION

§ 21a. The Problem

The estimate of the National Income on the basis of incomes received attempts to find and summate the money values of the incomes of all persons who are reported by the Census as "gainfully employed." The theory underlying this estimate is that all of the National Income in every year must be received by some person. An addition must, however, be made for the surplus incomes of corporations which are carried forward after the current distributions to stockholders have been made. Owing to the form in which our data are available, it has not been possible to distribute these amounts among individuals, and it is therefore necessary to add them in a lump sum to the individual incomes in order to arrive at the total National Income. If the data were perfect and the methods impeccable in both cases the results of this estimate would agree with the results of the Estimate by Sources of Production presented in Part I.

Needless to say, neither the data nor the methods are perfect in either case. The theory on which the two estimates are based is discussed in Section iv of Chapter II, Volume I, but it may save misunderstanding to note again the omission of certain items that contribute to the economic welfare of the community, and the intention to omit one item that counts as money income to individuals. It is not feasible to include items of income on which a money value is not commonly placed. For example, no allowance is made for the services rendered the community by such public works as roads and bridges, beyond the income received by those who work upon them. Nor is any attempt made here to set a money value upon the services rendered by housewives to their families. On the other hand, we do include two items which do not enter into exchange, but which may apparently be measured with reasonable accuracy. These are the rental values of homes owned by the persons who occupy them, and the produce of the farms directly consumed by farmers. In addition, we include some spurious income arising from accretions to the money value of property unchanged in quality and quantity. Such items as the rise in the prices of building lots do not increase the volume of serviceable goods at the disposal of the Nation and therefore such items should not be in-

cluded in a statement of the National Income. But the individuals who own these lots may get personal income from the rise in land values, and income resulting from sales of property at enhanced prices, is supposed to be included in the income-tax returns on which this estimate is largely based. During the period covered by the present investigation, however, it seems probable that the error arising from this source is not serious, for the high rates of taxation imposed at the time when prices were rising to their maximum discouraged the sale of property that had appreciated in value, and encouraged "loss-taking" sales of property that had fallen in value.

§ 21b. The Method and Data

The method adopted in making the Estimate by Incomes Received was determined largely by the character of the data that were available. The largest and most accurate body of material is found in the income-tax returns. Here are definite figures regarding the number and aggregate amount of personal incomes above the exemption limits set by law—$3,000 from 1913 (when the present income tax was first levied) to 1916, and $2,000 from 1917 onwards. These returns have well-known defects, but defects which can be corrected in some measure. A second great body of material is the mass of wages data collected by federal, state and city governments. Such data make it possible to estimate the aggregate incomes of the millions of those wage-earners and others gainfully employed who make no income-tax returns.

The income-tax data have to be supplemented by estimates for income exempt by law from taxation—especially certain state salaries, interest on tax-free securities, and the rental value of houses occupied by their owners. More important and more speculative are the corrections that must be made for failure to report incomes subject to tax and for understatement of reported incomes. Similarly in the chapter dealing with incomes less than $2,000 per year, we cannot accept wages earned as equivalent to income received. Here the chief supplements include the rental value of owned homes, income from property and pensions.

The character of these materials, it will be noted, makes it necessary to divide the Estimate by Incomes Received into two sections, persons receiving more and persons receiving less than $2,000 per year. This division at the $2,000 line is probably as satisfactory as any other arbitrary division that could be selected. A little below this line we approach the minimum budget on which a family can maintain efficiency, while a little above $2,000 we enter the range of modest comfort. For an individual without dependents we have on the lower side sufficiency, on the upper side, ease.

Of course, any arbitrary line of division maintained through a period of such wild fluctuations in the cost of living as occurred during the war is open to the objection that the economic welfare represented by it was constantly changing. This defect we remedy so far as possible by computing the average per capita income of income-receivers, and by showing the fluctuations in the purchasing power of their current receipts.

A third large body of data and, therefore, a third section of this estimate concerns the incomes of farmers. Relatively few farmers make income-tax returns, so that we can learn little about their affairs from the Internal Revenue Bureau's publications. Chief reliance must be placed upon the annual estimates of the "gross value of wealth produced on farms" made by the Department of Agriculture. But these estimates confessedly include a vast amount of duplication which must be corrected as well as may be by resort to various special studies of farm economics. Farmers are less accustomed to keep books than perhaps any other large class of business men; and to keep their books correctly is peculiarly difficult because the value of the food and fuel they produce for their own consumption must be estimated, as well as the rental value of their owned homes. What is difficult for the individual farmer to do accurately is impossible for the outside investigator to do accurately for six and a half millions of farmers. Hence the estimate of farmers' incomes and especially the number of farmers having incomes above the $2,000 line and consequently also of those below this line is subject to a considerable margin of error.

The last section of the estimate is concerned with a type of income about which there is much discussion—corporate surpluses. There are those who deny that these surpluses are to be regarded as in any true sense part of the National Income. For this reason, we keep this item separate and give totals both for all individual incomes and for individual incomes plus corporate surpluses. Our investigation of corporate finance inclines us to believe that some 80–90 per cent of corporate surpluses are genuine income, invested in the extension of plant and equipment in the same way as is fresh capital raised by stock or bond issues.

Since the amount of income reported to the Bureau of Internal Revenue as due to sales of property is a negligible item, we conclude that these surpluses have not been shown in individual incomes during the prosperous years covered by this report. In years of depression, the surplus accounts of corporations suffer a great decline, and may turn into deficits. If we did not include this item in our estimates, we should make the National Income more stable than it actually is.

After the manuscript of Volume I was sent to press, certain additional data have become available which have enabled us to make minor revis-

ions in the Estimate by Incomes Received. It is our hope to make further revisions of this sort in our published reports whenever materials and opportunity permit. Even the present revised results for 1910–1919 are not final, but merely the best approximations which we can make from the data now at hand.

CHAPTER 22

TOTAL AMOUNT OF INCOME RECEIVED BY PERSONS HAVING OVER $2,000 PER YEAR

§ 22a. Introduction

The estimate of the total income of persons receiving over $2,000 per year is based on income-tax returns, on data regarding tax-exempt income, and on incomes of farmers having over $2,000 per year. These three parts of the estimate are discussed in detail in the following sections. Table 22A presents the final results.

TABLE 22A

ESTIMATED TOTAL NUMBER OF PERSONS AND TOTAL AMOUNT OF INCOME FROM ALL SOURCES RECEIVED BY ALL PERSONS HAVING INCOMES OVER $2,000

1910 to 1920

Year	Income in millions of dollars				Number of persons		
	I Income tax data [a] (excluding farmers)	II Tax-exempt income [b]	III Farmers' incomes [c] over $2,000	IV Total	V Number of persons (excluding farmers)	VI Number of farmers	VII Total number of persons
1910...	$ 8,800 [d]	$ 792	$ 258	$ 9,850	1,300,000	111,000	1,411,000
1911...	8,600 [d]	806	182	9,588	1,300,000	79,000	1,379,000
1912...	8,800 [d]	818	262	9,880	1,300,000	111,000	1,411,000
1913...	9,000	830	340	10,170	1,300,000	143,000	1,443,000
1914...	8,700	843	340	9,883	1,300,000	144,000	1,444,000
1915...	10,000	858	516	11,374	1,800,000	208,000	2,008,000
1916...	13,500	973	1,179	15,652	2,300,000	448,000	2,748,000
1917...	16,000	1,008	3,886	20,894	2,900,000	1,313,000	4,213,000
1918...	16,200	1,279	5,784	23,263	3,100,000	1,861,000	4,961,000
1919...	17,500	1,550	6,298	25,348	3,600,000	2,008,000	5,608,000
1920...		1,573	2,261			804,000	

[a] See § 22b.
[b] See § 22c.
[c] See Table 24K.
[d] Estimated.

§ 22b. Estimate from Income Tax Data

Two questions must be answered before the income-tax data as reported by the Bureau of Internal Revenue can be utilized. How much are re-

ported incomes understated and what is the amount of incomes that should be, but are not reported? For brevity we shall call these two defects of the data "understatement" and "failure to report." Failure to report is frequent in the lower income ranges where the exemptions allowed by law would nearly or entirely cover income received; understatement is prevalent in the higher income ranges where most elaborate methods are often resorted to in order to avoid payment of the tax.

Changes in the law itself and in the methods of collecting the tax make comparison between different years difficult. In the years 1913 to 1916, incomes above $3,000 are reported and thereafter above $2,000.[1] Further, the deduction of losses incurred in transactions outside of the particular business in which the tax payer was engaged was not permitted in the early years, but in 1917 this ruling was changed so as to permit the writing off of all losses.

It should be noted that profits made from sales of investments or property are included as income under the income-tax law. In Volume I it is held that such profits are a part of individual, but not of National Income.[2] It may be thought that gains of this sort were enormously increased after 1916 by the rise of prices. If all property had actually been sold at current quotations the tax returns would include a vast volume of clearly fictitious income. The fact is, however, that the increased income taxes were an effective deterrent from making realizing sales, so that only a negligible portion of this fictitious income was included in the tax returns. And this portion is probably more than offset by the volume of "loss-taking" sales of property which had declined in price—sales made purposely to reduce the amount of taxable income.

Another factor which must be considered in estimating both the amount of understatement and failure to report is the administration of the income-tax law. This has naturally improved with experience so that the returns are far more accurate for the later than for the earlier years. In particular, an attempt has been made since 1918 to reduce the amount of evasion by "intensive drives" in the $2,000 to $5,000 range.

On the other hand, since the armistice technical means to reduce the income reported have been resorted to on a far larger scale than during the war. In particular, the practice of turning over a portion of income-bearing securities to members of the family in order to avoid or lessen taxation is more frequent. This practice may result only in dividing the same amount of income into smaller units; but it may also lessen total income because gifts are counted at their market value at the date of the gift and therefore do not include appreciation of value since their original

[1] No use is made of the data for incomes between $1,000 and $2,000, as they apply only single persons, and are therefore only a part of all the incomes in these ranges.

[2] See Volume I, page 45.

purchase by the donor. This device makes it possible to sell securities without reporting appreciated value. This fact is not of much consequence, however, for the appreciation in the value of securities may in part represent the accumulation of corporate surplus which we include under a separate head, and in part an increase in the price of unchanged property, which we do not wish to include. In addition, the practice of forming investment corporations for the purpose of avoiding or lessening taxation has increased. By this means, surpluses above the current needs of the stockholders are retained by the corporation and hence are not reported as personal income. There is no way of ascertaining with exactness the extent of this practice.[1]

With these general considerations in mind, the data may now be presented. Careful study, year by year, of the figures appearing in the following tables and in the charts in Volume I should enable us to make an estimate allowing for evasion and understatement due to the differences in the methods of collecting the tax in different years, and to changes in the law itself. Concerning the failure to make returns and the inaccuracy of many of the returns made, we have little information beyond a surmise that the omissions are considerable. It is hoped that there will shortly be available the results of audits which will furnish a better basis for an estimate.

The following table shows the total number of persons and amount of income reported by the Bureau of Internal Revenue. Figures are also given for the probable amount of income and number of persons having incomes over $2,000 in 1913 to 1916. This estimate was made after comparison between the average number of persons and amount of income in the $2,000 to $3,000 class in 1917, 1918, and 1919 with those having $3,000 and over. It was found that about 30 per cent of the total income, and about 50 per cent of income-tax payers fell within this class. These percentages were accordingly used in estimating the amount of income and number of persons having over $2,000 in the earlier years, 1913 to 1916, as shown in columns II and IV of Table 22B. Doubtless, some degree of error is involved in this estimate because of the rise in prices and the steeper slope of the curve in the later years than in the earlier; but after considerable study no better method has been found.

In order to study the probable amount of failure to report and under-

[1] Probably, 90 per cent of the corporations in the United States represent merely individuals or a small group of individuals doing business through the medium of a corporation. In these cases, there is a strong tendency to withhold dividends. Additions to corporate surplus in such companies are certainly as much income as corresponding items of partnerships or sole traders.

It is to be noted that the war additions to corporate surplus (after taxes) have been wiped out in large measure by (1) the 1920 to 1921 depression and (2) by investments in plant facilities that are unrealizable through either operation or sale.—J. E. Sterrett.

TABLE 22B

THE OFFICIAL INCOME TAX RETURNS ON THE BASIS OF A UNIFORM EXEMPTION LIMIT OF $2,000

(No correction for failure to report, understatement, or tax-exempt income)

1913 to 1920

Year	Number of persons		Amount of income (Millions of dollars)	
	I Reported under the income-tax law [a]	II Estimated incomes over $2,000	III Reported under the Income-tax Law [a]	IV Estimated incomes over $2,000
1913	357,598 [c]	715,000 [b]	$ 3,900 [c]	$ 5,100 [b]
1914	357,515 [c]	715,000 [b]	4,000 [c]	5,200 [b]
1915	336,652 [c]	673,000 [b]	4,600 [c]	5,900 [b]
1916	437,036 [c]	874,000 [b]	6,299 [c]	8,100 [b]
1917	1,832,132 [d]	1,832,132 [d]	11,191 [d]	11,191 [d]
1918	2,908,176 [d]	2,908,176 [d]	13,692 [d]	13,692 [d]
1919	3,407,888 [d]	3,407,888 [d]	17,030 [d]	17,030 [d]
1920	7,000,000 [e]			

[a] *Annual Report* of the Secretary of the Treasury, June 30, 1914, p. 628. Bureau of Internal Revenue, *Statistics of Income*, 1916, pp. 14, 23; 1917, pp. 28, 29; 1918, pp. 36, 37; Preliminary report for 1919, p. 8.

[b] On the basis of 1917, 1918, and 1919, see text.

[c] For incomes over $3,000.

[d] Actual number or amount reported for incomes over $2,000.

[e] Preliminary figure including incomes over $1,000.

statement of income for each year, the income-tax data were plotted on a logarithmic scale. These charts are reproduced on pages 120 and 121 of Volume I. A chart on a logarithmic scale emphasizes small arithmetic increments or decrements in the lower numbers and minimizes them in the larger numbers. A slight change, therefore, in the shape of the curve at the left hand (lower income) end is of great importance, since it involves a large number of incomes. The advantage of charting the data in this form for analysis is illustrated in Part III of this volume.

It should be noted that the curves for each year show a general similarity in the direction and angle of slope. Reading toward the left from the right hand side of the chart, the curves for 1913 to 1916 fall off at the $5,000 point, whereas the curve for 1917 is almost a straight line. In 1918 and 1919 the curves turn sharply upward at this point. These observations indicate (1) that the comparative number of incomes reported in the $2,000 to $5,000 ranges in the earlier years was less than in the later years; [1]

[1] In order to discover tax delinquents in 1918, all employers were required to report the

and suggest (2) that the reporting of incomes in the $5,000 to, say, $50,000 ranges was less complete than in the higher ranges.

To show more fully the situation in the lower income ranges in the years 1917 to 1919, the following table has been made.

TABLE 22C

COMPARISON OF REPORTED NET INCOME, INCOME FROM SALARIES, AND INCOME FROM BUSINESS OF PERSONS RECEIVING $2,000 TO $5,000 PER YEAR

1917 to 1919

Year	Number of Persons	Net income	Income from salaries (Thousands of dollars)	Income from business
1917 [a]	1,399,470	$4,180,842	$1,853,648	$1,802,641
1918 [b]	2,429,214	7,162,044	4,389,992	1,733,831
1919 [c]	2,750,229	8,320,550	5,445,578	1,860,148

[a] *Statistics of Income*, 1917, pp. 40, 41.
[b] *Statistics of Income*, 1918, p. 44.
[c] *Statistics of Income*, 1919, Preliminary Report, pp. 8, 11.

Income returns of less than $5,000 were checked in the field from 1918 on,[1] while those of over $5,000 were sent to Washington and checked by the central force. This system resulted in the greatest care being given to the smaller incomes and to the large ones of say $50,000 or more. The Washington force has in the past been inadequate to audit all the returns, and in addition has been so far in arrears that its findings have been made too late to affect the statistical data, which are of necessity computed from the returns as they are originally reported. The dip in the curve between $5,000 and $50,000 in these years may thus reflect understatement of incomes and be due largely to the technique of the Bureau of Internal Revenue. The figures for incomes above $50,000 are believed by competent authorities to be technically almost accurate, containing only such understatements as can be made within the letter of the law. The amount of such understatement is included in the estimate in § 22c on Tax-exempt Income.

Further light is apparently thrown on the general problem of understatement by a comparison of the average amounts of income reported in each year.

amounts over $1,000 paid to any individual in wages. The result of this drive was that the amount of income reported between $2,000 and $5,000 as received from wages or salaries was greatly increased. No such simple method has been devised for detecting delinquents among men doing business in a small way on their own account, however, and in 1918 the number of such persons filing income-tax returns actually declined. We cannot, therefore, believe that failure to report has yet been reduced within narrow limits.

[1] Returns for the year 1917.

TABLE 22D

AVERAGE INCOME OF PERSONS RECEIVING OVER $3,000

1913 to 1919

Year	Number of persons (Thousands)	Total income (Millions of dollars)	Average income
1913	357 [a]	$ 3,900 [b]	$10,906
1914	357 [b]	4,000 [b]	11,188
1915	336 [b]	4,600 [b]	13,664
1916	437 [b]	6,298 [b]	14,415
1917	993 [c]	9,126 [c]	9,187
1918	1,411 [d]	10,065 [d]	7,132
1919	1,838 [e]	13,223 [e]	7,194

[a] *Annual Report* of the Secretary of the Treasury, June 30, 1914, p. 628.
[b] *Statistics of Income*, 1916, p. 14.
[c] *Statistics of Income*, 1917, p. 28.
[d] *Statistics of Income*, 1918, p. 36.
[e] *Statistics of Income*, 1919, Preliminary Report, p. 8.

According to this table the average income over $3,000 increased rapidly from 1913 to 1916, dropped violently in 1917, and declined still further in 1918. These changes are the net resultant of several factors. (1) Incomes already large doubtless grew rapidly larger with the recovery from the depression of 1913–14, and the sudden uprush of prices after the middle of 1915. (2) On the other hand, these large incomes were probably reduced in 1917–19 by the encroachments made upon profits by increasing costs of doing business. (3) The war-time rise of wages, salaries, professional fees and of the gains of small business men carried many incomes for the first time in the lives of their recipients above the $3,000 line, and of course this rapid increase in the number of incomes in the $3,000–$5,000 intervals tended powerfully to reduce the average of all incomes above $3,000. (4) After the effect of these three factors has been allowed for the figures still suggest that a considerable rôle was played by fuller reporting of small incomes. The reduction of the exemption limit from $3,000 to $2,000 in 1917, the patriotic spirit that made people more willing to pay taxes during the war and the "intensive drive" of 1918 all contributed to this result.

In so complex a situation it is impossible to attribute its due effect to each of the intermingled factors. Yet a rough series of corrections can be made to give approximations much closer to the whole truth than the official figures give. The method adopted is first to correct the official returns for 1918, and then to use these new estimates as a basis for correcting the figures for earlier years.

The probable amount of understatement and failure to report income in 1918 was estimated as follows:

1. The failure to report incomes from business in the $2,000 to $5,000 range was considerable. The doubling of incomes from salaries owing to the "drive" in 1918 indicates that an equally successful effort to find small business incomes would have had large results. For our purposes, the best guess is to double the amount reported under this head—a correction which adds $1,298 million to the total.

2. The understatement of income from salaries in 1918 was probably very much less. This item had been increased very largely over 1917, and the manner in which the work was conducted indicates that nearly all salaries were found. However, since this item showed a still further increase of over a billion dollars in 1919, it is probable that there was still some understatement in 1918. This amounted to perhaps one-tenth of the reported total, or $370 billion.

3. The understatement of the incomes between $5,000 and $50,000 is very difficult to estimate. In these ranges, there were reported in 1917, 415,000 incomes, totalling $4,560 million; in 1918, 465,000 incomes, totalling $4,860 million; and in 1919, 640,000 incomes, totalling $6,645 million. It is known that this class escaped attention in 1918 to a greater degree than either the larger or smaller incomes, and this point is graphically illustrated by the "dip" shown in the preceding charts. It is noteworthy that in 1919 the "dip" was to some extent reduced. An elimination of the "dip" and a reading of the points on the redrawn curve for 1918 indicates a possible increase of from $1 to $3 billion; the points are so fine at this stage of a logarithmetic chart that the slightest variation causes an enormous difference in the readings. A flat increase of $2 billion for the understatement in these ranges in 1918, then, appears to be as close a correction as can be made.

A summary of these corrections in tabular form follows:—

TABLE 22E

ESTIMATED AMOUNT OF INCOME SUBJECT TO TAXATION IN 1918

(Excluding farmers)

(Millions of dollars)

Income reported over $2,000	$13,692 [a]
Less Farmers' Income	1,123 [b]
	$12,569
Add Estimated Business delinquencies ($2,000–$5,000)	1,298 [c]
Estimated Salary delinquencies ($2,000–$5,000)	370 [c]
Estimated General delinquencies ($5,000–$50,000)	2,000 [c]
Total Estimated Income	$16,237

[a] *Statistics of Income*, 1918, pp. 36, 37. [b] *Statistics of Income*, 1918, p. 11.
[c] See text.

When the curve for 1918 is redrawn on the basis of $16.2 billion instead of $13.7 billion total income, it shows only a small "dip" in place of the very pronounced one shown in Chart 22B. If a similar computation is made for earlier years, based on the results for 1918, and if the general information contained in the preceding charts and tables is utilized, then the approximation to the income over $2,000 for each of these years is as follows:—

TABLE 22F

ESTIMATED TOTAL NUMBER OF PERSONS AND AMOUNT OF TAXABLE INCOME OF PERSONS RECEIVING INCOMES OVER $2,000 PER YEAR

(Excluding farmers)

1913 to 1920

	Number of persons (Millions)	Total income (Billions)	Minimum and maximum estimates (Billions)
1913	1.3	$ 9.0	$ 7–10
1914	1.3	8.7	7–10
1915	1.8	10.0	8–12
1916	2.3	13.5	12–15
1917	2.9	16.0	15–19
1918	3.1	16.2	15–19
1919	3.6	17.5	17–20
1920			

Needless to say, any method of estimating money income that ought to be, but is not, reported to the taxing authorities yields merely rough approximations. It cannot be pointed out too often that the exactness of the figures used is purely technical. However, they are the result of an exhaustive scrutiny and analysis of the existing data, and a careful study of the best means of interpreting them. No final solution of the income distribution problem can be reached until we have an accurate census of the incomes of all the people in the country, or at least of a large and *well selected* sample.

§ 22c. Tax-exempt Income

In addition to the kind of incomes which are or should be reported by persons under the income-tax law, there are some forms of income which are not reported because they are exempt from taxation. Certain items of this tax-exempt income can be said with some assurance to accrue almost entirely to those having incomes over $2,000, for example, income from state or local bonds and Federal Farm Loan Bonds. Other types of income, such as the interest on Liberty Bonds, state and local salaries, and income

from homes owned by their occupants, are known to be divided between those having incomes over and under $2,000. Where no statistical information was obtainable, we have apportioned such incomes in the manner which seemed, all things considered, most probable.

The following table is presented to show the amount of income which accrues to the persons falling under the income-tax law and for which they are not required to make any return.

TABLE 22G

ESTIMATED TAX-EXEMPT INCOME [a]

1910 to 1920

(Tax-exempt Agricultural Income Omitted)

(Millions of dollars)

Year	I Interest on local debt	II Interest on Liberty Bonds	III Interest on Federal Farm Loan Bonds	IV Interest on obligations of possessions of U. S. [b]	V Income exempt through nature of occupation [c]	VI Rental value of homes owned	VII Total
1910	$134	$	$	$3	$155	$500	$ 792
1911	148			3	155	500	806
1912	160			3	155	500	818
1913	172			3	155	500	830
1914	185			3	155	500	843
1915	200			3	155	500	858
1916	215			3	155	600	973
1917	228	20	1	4	155	600	1,008
1918	236	180	4	4	155	700	1,279
1919	259	380	7	4	200	700	1,550
1920	282	380 [d]	7 [d]	4	200	700	1,573

[a] See the following tables for references.
[b] And also U. S. bonds issued prior to 1917.
[c] State, city and county salaries.
[d] Estimated.

The items of this table are taken up in the following divisions.

1. Local Debts.

The next table gives the amount of state, municipal and local debts in 1913.

The security issues subsequent to 1913 are recorded by the *Bond Buyer* which has the most complete records available. An estimate of the amount of refunding may be obtained by comparing the total issues reported by the *Bond Buyer* with the actual increase as shown by successive Census reports. In 1902, the Census of *Wealth, Debt and Taxation* reported a

TABLE 22H

TOTAL AMOUNT OF STATE, MUNICIPAL, COUNTY, AND LOCAL BONDS OUTSTANDING [a]

1913

State	$ 345,942,305
Municipal	2,884,882,726
County	371,528,268
Specified Civil Divisions	100,672,758
School Districts	118,870,601
Total	$3,821,896,658

[a] U. S. Department of Commerce, Bureau of the Census, *Wealth, Debt, and Taxation*, 1913. Sinking funds excluded.

total of $1,865 million for debts of states, municipalities, and localities as compared with $3,822 million in 1913. This increase of $1,967 million compares with total issues of about $3,100 million reported during the same period in the *Bond Buyer*. Accordingly, the issues reported annually by the *Bond Buyer* have been reduced by one-third to represent the approximate net increase in indebtedness.

The following table shows the new issues of securities for each year, the estimated increase of indebtedness, and the total estimated interest payments.

TABLE 22I

ESTIMATED TOTAL DEBT AND INTEREST PAYMENTS OF STATES, MUNICIPALITIES, COUNTIES, AND LOCALITIES

1910 to 1920

(Millions of dollars)

Year	I Amount issued [a]	II Estimated net increase of debt	III Estimated total debt	IV Total interest at 4.5% [c]
1910	$324	$216	$2,983	$134
1911	452	301	3,284	148
1912	399	266	3,550	160
1913	408	272	3,822 [b]	172
1914	446	297	4,119	185
1915	493	329	4,448	200
1916	497	331	4,779	215
1917	445	297	5,076	228
1918	263	175	5,251	236
1919	770	513	5,764	259
1920	745	497	6,261	282

[a] *Bond Buyer*, Jan. 3, 1920, p. 34, and Jan. 8, 1921, p. 32.
[b] Bureau of the Census, *Wealth, Debt and Taxation*, 1913.
[c] The average weighted rate of interest of samples of loans issued at various dates was 4.47 per cent. The increase in interest rates in 1919 affects only a small fraction of the total debt.

2. Liberty Bonds.

Liberty Bond issues outstanding at different dates were of the following amounts:

TABLE 22J

APPROXIMATE VALUE OF LIBERTY BONDS OUTSTANDING

1917 to 1919

(Millions of dollars)

	1917 [a]	1918 [b]	1919 [c]	1920
1st (3½%)	$1,466	$1,989	$1,985	$1,953 [d]
2nd (4%)		3,747	3,566	3,325 [d]
3rd (4¼%)		3,228	3,959	3,663 [d]
4th (4¼%)			6,794	6,394 [d]
Victory (3¾% & 4¾%)			3,468	4,246 [d]
W. S. S. (4%)		350	954	954 [e]
Total	1,466	9,314	20,726	20,535

[a] Report of the Secretary of the Treasury, 1917, p. 56.
[b] Report of the Secretary of the Treasury, 1918, p. 157.
[c] Report of the Secretary of the Treasury, 1919, p. 214.
[d] Report of the Secretary of the Treasury, 1920, p. 451.
[e] 1919 figure carried forward.

Of these issues, the First Liberty Loan and part of the Victory Loan are entirely tax-exempt. The others are exempt only within rather narrow limits.

The income from these bonds is divided between banks, corporations and individuals. The following table shows the estimated amounts held by banks on the one hand and by corporations and individuals on the other.

In order to estimate roughly the income from Liberty Bonds received by individuals having incomes over $2,000, estimates of the interest received by corporations, and by individuals having incomes under $2,000 must be made. An examination of corporation statements leads to the conclusion that about $40 millions of such interest was paid to corporations in 1918 and $90 millions in 1919. Subtracting these amounts from the figures shown in the last column of Table 22K, we get a total received by individuals of about $27 millions in 1917, $262 millions in 1918 and $683 millions in 1919. Seventy per cent of these amounts [1] may be considered

[1] The original amounts of the bonds issued in the different denominations are as follows:—

$10,000	$3,209,810,000
5,000	1,493,060,000
1,000	9,767,222,000
500	2,095,775,000
100	3,389,800,900
50	2,814,924,850

(*Annual Report* of the Secretary of the Treasury, 1920, p. 435.) The amounts owned by

TABLE 22K

ESTIMATED DIVISION OF THE INCOME FROM LIBERTY BONDS BETWEEN BANKS, CORPORATIONS AND INDIVIDUALS

1917 to 1919

(Millions of dollars)

Year	Bonds outstanding			Income from bonds		
	I Total amount outstanding	II Amount held by banks[a]	III Amount held by corporations and individuals	IV Estimated total income	V Estimated income of banks	VI Estimated income of corporations and individuals
1917.....	$ 1,466	$ 703	$ 763	$ 51	$24	$ 27
1918.....	9,314	1,374	7,940	357	55	302
1919.....	20,726	1,450	19,276	834	61	773

[a] Reports of Comptroller of the Currency, 1917, v. I, p. 11; 1918, v. I, p. 16; 1919, v. I, p. 40.

a fair guess at the proportion held by individuals with incomes over $2,000; which suggests as the probable amount of tax-exempt personal income from this source, about $20 millions in 1917, $180 millions in 1918, and $480 millions in 1919. The later issues were more narrowly tax-exempt, so that a considerable portion of the interest received in 1919 had to be reported in the income-tax returns. The actual exemption in that year was then less than $480 millions by perhaps $100 millions, or say $380 millions. No change of any moment from this amount is warranted for 1920, and the same figure is used for that year.

3. Federal Farm Loans.

The following table gives the amount of Federal Farm Loan Bonds outstanding in recent years. The Farm Loan Board estimates that practically the entire issue is in the hands of the public and not in the hands of commercial banks.

banks and corporations must have been in the neighborhood of four billion dollars—probably for the most part in large denominations. Few people having incomes of less than $2,000 could be expected to own bonds of $500; and some of the persons having incomes of over $2,000 would own bonds of $50 or $100. The division of the bonds between persons having more than $2,000 and less than $2,000 would be approximately as follows:

To persons having over $2,000; $16,566 million, being the sum of the denominations of $500 to $10,000, plus one-tenth of the $50 and $100 ($620 million), a total of $17.3 billion; less $4 billion, the amount held by banks and corporations, giving a final amount of $13.3 billion. To persons having less than $2,000; nine-tenths of the $50 and $100 bonds, or $5,584 million. This would give 70 per cent of the bond interest credited to individuals to persons having over $2,000.

TABLE 22L

FEDERAL FARM LOAN BONDS OUTSTANDING

1917 to 1919 (Thousands of dollars)

	1917	1918	1919
Bonds outstanding [a]	$21,447	$140,122	$285,500
Bonds held by the Treasury [b]	0	56,865	136,885
Bonds held by the Public	$21,447	$83,257	$148,615
Income from Bonds held by the Public [c]	992	3,851	6,873

[a] On October 31.
[b] Unpublished figures furnished by the Assistant Secretary of the Federal Farm Loan Bureau.
[c] These loans pay from 4 1/2 per cent to 5 per cent and the interest rate is computed on the basis of 4 5/8 per cent.

4. U. S. Bond Issues prior to 1917 and Bonds of U. S. Possessions.

U. S. Bonds issued prior to the year 1917 consisted on June 30, 1919 of the following:

TABLE 22M

U. S. BONDS ISSUED PRIOR TO 1917 [a]

	Rate of interest	Amount	Principal holder
Consols of 1930	2%	$599,724,050	Banks
Loans of 1925	4	118,849,900	Banks
Panama Canal Loan	2	74,901,580	Banks
Panama Canal Loan	3	50,000,000	Public
Conversion Bonds	3	28,894,900	Banks
Postal Savings Bonds	2½	11,349,960	Public

[a] Report of the Secretary of the Treasury, 1919, p. 113.

With slight changes, reported annually by the Secretary of the Treasury, the interest on these amounts is about $22 million. A large number of these bonds are held by banks; the best estimates obtainable show that only the Panama 3 per cent bonds and the Postal Savings Bonds are to any extent in the hands of the public.[1] The annual income from the bond issues which are held largely by the public accordingly amounts to $1,784,000. To these issues must be added the interest on bonds of the possessions of the United States (Hawaii, Philippines and Porto Rico). The amounts involved are small. In 1910 the total debt was $22 million and mounted gradually to $41 million in 1920. The interest at the earlier date, therefore, was approximately $880,000 and at the later date,

[1] Estimate made by Commission of Public Debt, August 25, 1920.

$1,640,000. These two amounts add up to about $3 million per year for the earlier years and $4 million per year for the later years.

5. State, City and County Salaries.

The expenditures for salaries by states, cities and counties are not subject to the Federal income tax, and such salaries as are above $2,000 should, therefore, be added to the income which is known to accrue to certain individuals. The data are mainly taken from the Census publications, *Financial Statistics of States*, 1918, *Financial Statistics of Cities*, 1918, and *County Revenues, Expenditures and Public Properties*, 1913. From the data given in these reports, other expenses, such as payments for upkeep, interest, and general expenses, have been excluded in Column II of Table 22N, and the final estimate has been a rough paring-down of the remainder. A number of items included both salaries and upkeep, so that an itemized division is not practicable and no more elaborate method is warranted under the circumstances. A check on the salaries paid by states was, however, possible. The reports of six States were scrutinized with great care, and an estimate for the entire country was made on the basis of each state. This estimate varied from $159 to $270 million, the average being $202 million. In view of this, the final estimate of $200 million for state salaries appears reasonable. City and county estimates are reduced in an approximately similar ratio.

TABLE 22N

ESTIMATED TOTAL SALARIES PAID TO STATE OFFICIALS

1918

State	I Actual amount of total salaries paid	II Estimated amount of total salaries paid	III Per cent of population of U. S. residing in State	IV Estimated amount of salaries paid by all States on the basis of one State
California [a]		$7,898,591	2.92	$270,499,690
Indiana [b]		5,744,887	2.76	208,148,000
Louisiana [c]		2,849,546	1.79	159,192,510
New York [d]	$16,092,581		9.91	159,477,477
Virginia [e]		3,792,260	2.135	177,623,410
Wisconsin [f]		5,728,231	2.426	236,118,340
Average of six preceding estimates				$201,842,236

[a] California *Biennial Report* of the State Comptroller, 1917 to 1918.
[b] Indiana *Year Book*, 1919.
[c] Louisiana *Biennial Report* of Auditor, 1918.
[d] New York *Report* of Comptroller, 1917, Part 3, p. 11.
[e] Virginia *Annual Report* of Treasurer, August 3, 1918.
[f] Wisconsin *Report* of Treasury, June 30, 1917.

In order to determine the percentage of state salaries larger than $2,000, 1,500 samples were taken from the U. S. Official Register for 1911, 1917, and 1919 by choosing the top right hand amount on each page. These samples indicated that about 8 per cent of government employees receiving about 20 per cent of the total salaries fell in the class having salaries of over $2,000, the percentage being about the same for each year. This percentage is used in Column III of Table 220. Since government salaries did not increase in any marked degree until 1919, when the average increase was about 30 per cent, the same total of $155 million is kept from 1913 to 1918, and $200 million is estimated for 1919 and 1920.

TABLE 220

ESTIMATED TOTAL SALARIES PAID TO STATE, CITY AND COUNTY OFFICIALS

(Thousands of dollars)

	I Total expenses of general departments [a]	II Estimated total salaries	III Estimated salaries over $2,000 (20 per cent of Col. II)
State (1918)	$297,801 [b]	$200,000	$ 40,000
Cities over 2,500 (1913)	666,384 [c]	400,000	80,000
Counties (1913)	277,735 [d]	175,000	35,000
Total		$775,000	$155,000

[a] Expenses of General Departments include administrative and other expenses for (a) General Government, (b) Protection to Persons and Property, (c) Conservation of Health and Sanitation, (d) Highways, (e) Charities, Hospitals and Corrections, (f) Schools and Libraries, (g) Recreation, (h) Miscellaneous.

[b] Bureau of the Census, *Financial Statistics of States*, 1918, Table 10.

[c] Census of *Municipal Revenues, Expenditures and Public Properties*, 1913, p. 182, Table 5.

[d] Bureau of the Census, *Wealth, Debt and Taxation*, 1913, v. II, Table 5, p. 210.,

6. Rental Value of Homes Owned by their Occupants.

To estimate the value of the rentals of homes owned by persons in the income class above $2,000, it is necessary to fall back on broad generalizations. No definite body of data exists. The number of persons excluding farmers falling into this group and their total incomes are shown in Table 22A.

The Census of 1910 reports about five and one-quarter million houses owned by occupiers, excluding farmers. This is about 40 per cent of the fourteen million families in the country. Since home ownership has increased among the wealthy, especially in recent years, because of the

income-tax exemption, it is not improbable that one-half of the income-tax payers own their homes.

There does not appear to be any information in regard to the relation of income to rent for the higher class incomes. The Bureau of Labor Statistics finds 13.4 per cent to be the proportion of rent to income for working class families.[1] These data, which include incomes up to $2,500, show that the percentage decreases with a rise in the incomes; for incomes above $2,500 we have no data regarding the relation between rent and income. Without a complete Census, or at least a typical sample of incomes, rents, and ownership of homes of the different income classes of the country, any estimate must be mere conjecture.

The proportion of 13.4 per cent above mentioned, when applied to one-half the total amount of income, estimated for the class above $2,000, yields results ranging from one-half billion to three-fourths billion dollars. In view of the increase in the number of income-tax payers between 1913 and 1919, together with the increase in the amount of income, it is concluded that the total value of rents increased from about one-half to three-fourths billion dollars. Because of the need of placing a definite amount in Table 22G, amounts varying from $500 to $700 million are inserted, but their accuracy is only nominal.

[1] *Monthly Labor Review*, August, 1919, p. 118.

CHAPTER 23

TOTAL AMOUNT OF INCOME RECEIVED BY PERSONS HAVING UNDER $2,000

§ 23a. Introduction

By far the larger number of persons gainfully employed have incomes under $2,000; and of these incomes, the major portion comes from personal earnings received in the form of wages. Profits of small business men and earnings of professional men, when they are less than $2,000, are not reported to the Bureau of Internal Revenue, and it has been necessary to assume that these average amounts are substantially on the same level with wages under $2,000. This assumption in regard to the average may not be far from the truth, even though the distribution of wages is quite different from that of profits and professional earnings. The error involved cannot in any case be very large. A study of typical distributions of these three types of income would be a valuable piece of work. It is on the information concerning wages, therefore, that the chief reliance must be placed in estimating incomes under $2,000.

In order, however, to arrive at the total for this group, estimates must be added for the income received from other sources. These are income from pensions, from homes owned by those who occupy them, and from investments. Once more the condition of the data makes it necessary to treat agriculture apart from other industries, so that separate estimates have to be made for the incomes of farm laborers and of farmers. The amount of each of these items together with the final figure for all incomes under $2,000 is shown in Table 23A.

§ 23b. Personal Earnings [1]

No wages Census has ever been taken in the United States. If there had been, this estimate would have been less difficult to make, and the results would doubtless be more trustworthy. Under the circumstances, the best means of arriving at the total wages paid is to estimate the average amount per person from such samples as are obtainable for each occupational group, and multiply this average by the number of persons actually working in this group. An estimate could also be made from the entire number of persons *connected with* an industry provided the aver-

[1] Except those of farm laborers and farmers, which are taken up in §§ 23c and 23g.

TABLE 23A

ESTIMATED TOTAL AMOUNT OF INCOME RECEIVED BY PERSONS HAVING INCOMES UNDER $2,000 PER YEAR [a]

(Millions of dollars)

Source of income	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920
Income from personal earnings	$13,711	$14,311	$14,971	$15,458	$15,462	$15,717	$18,294	$21,179	$27,777	$29,882	$33,020
Income of farm laborers	1,152	1,193	1,228	1,256	1,251	1,279	1,375	1,641	2,001	2,302	2,778
Income from pensions	175	175	173	196	196	191	187	191	212	257	(257)
Income from home ownership	600	600	600	600	600	605	611	618	660	726	879
Income from investments	823	859	898	927	928	943	1,098	1,271	1,667	1,793	1,981
Income of farmers under $2,000 [b]	3,692	3,518	3,738	3,860	3,860	4,184	4,621	4,914	4,666	4,552	4,939
Total income	$20,153	$20,656	$21,608	$22,297	$22,297	$22,919	$26,186	$29,814	$36,983	$39,512	$43,854
Number of persons (thousands)	32,412	32,973	33,399	33,635	33,422	32,907	34,906	34,520	35,961	33,913	34,076

[a] Care must be taken in the comparative use of these figures, for not only did the total number of gainfully employed increase during the period under consideration, but also the rise in prices carried the money incomes of many persons above $2,000 without making any actual addition to their real incomes. This point is discussed at length in Chapter 26.

[b] See Table 24K, page 313.

age wages were also estimated on that basis. But most of the average wages reported are based on the average number of workers actually employed at some one time. Hence, the first method is the more feasible.

Generally speaking, the average number of persons employed in an industry is from 3 per cent to 10 per cent less than the number of persons attached to the industry.[1] About 3 per cent are constantly out of employment because of sickness and other reasons and a certain additional per cent are irregularly out of work because of seasonal and cyclical fluctuations.

The occupational groups are divided in general accord with the scheme used in the *Census of Occupations* of 1910. In Table 23D are shown the numbers of persons actually at work in each year. From these figures have been subtracted the number of persons receiving incomes of over $2,000 estimated on the basis of the preceding chapter. (Tables 23E and 23F) The next step has been to estimate the average wages in each occupational group (Table 23G), and by multiplication of average wages and average numbers (Table 23H), to obtain a figure for total wages paid.

In some cases, the different samples from which the average wages presented in Table 23G were made up, showed considerable variation. However, in the most important groups, particularly in Manufacturing and Transportation, the results drawn from different sets of data checked against each other with a satisfactory degree of accuracy. After the table had been completed on the basis of independent estimates for each item, it was again studied to locate such inner discrepancies as might lead to the detection of errors, either in the relation of wages imputed to different years or to different occupations. Where discrepancies were found, additional information was sought. The result is presented as the nearest practical approximation of the facts we could make from the existing data.

It may be well to warn the reader against the attempt to estimate annual average earnings from hourly, daily or weekly rates of pay. While it is easy to multiply daily rates of pay by the number of working days in a year, this method involves some assumption as to the average number of days worked. Examples have been found of both annual average earnings and daily or weekly rates of wages, together with the number of days or weeks in operation, which show that the results found by multiplying average rates by days in operation give untrustworthy results. Wage rates, therefore, have been used only as indices and with the greatest possible care. This difficulty is most unfortunate because the great mass of the material to be had is in the form of hourly, daily or weekly rates of pay.

[1] Cf. Chapter 2, § d. Also Hornell Hart, *Fluctuations in Unemployment in Cities of the United States, 1902 to 1917.*

Taken as a whole, the data on which these tables rest are numerous and fairly reliable. As said above, the average number of persons employed is based on the 1910 *Census of Occupations*. As the Census reports the total number of persons gainfully employed in each occupational group, these figures have to be adjusted to the average number *actually* employed. This adjustment has been made in the case of Manufactures by comparing the monthly average number at work in 1909, reported in *Census of Manufactures*, 1909, with the highest number employed, and assuming the same ratio for 1910. Similar methods of approximating the number actually at work in 1910 have been applied to each occupation.[1]

The average wages found in each occupational group have been applied to the entire number of persons actually at work in that group. This plan involves a certain technical error, for some of those in every group work independently and hence, receive what is generally classified as "profits" and not "wages." No estimate that is more than a guess as to the total amount of these "profits" and as to the number who thus work independently is available. It has been found necessary, therefore, to assume that the average profits of those having an income under $2,000 is approximately the same as the average wages of employees engaged in the same industry. An exception is made in the case of "trade," where the large number of independent workers appears to indicate a rather higher income than one based strictly on wages.[2]

Furthermore, a major difficulty in classification should be pointed out. There are many cases in which the same person might fall within either of two groups. Examples are clerks employed by railroads, engineers connected with a factory or mine, lawyers or doctors holding public service positions, horseshoers or field clerks in the army, etc. Classifications decided upon by the Census Bureau were of necessity more or less arbitrary, but careful study has led to the conclusion that they are on the whole as satisfactory as any other set of arbitrary assignments. The only departures from the Census classification which we have made are (1) to shift a certain number of those engaged in manufacturing connected with mining (reported under manufacturing in the *Occupation Statistics* of 1910) to mines, and (2) to change a certain number of persons who on account of occupation were listed under manufacturing, to the army and navy, for which a separate group was made. Both changes are of small importance, but they are desirable because actual figures from other sources for later years are based on the revised classifications.

[1] The method here adopted makes probable a certain amount of understatement of annual income, owing to the real and regular mobility of labor in shifting from one industry to another. This is especially the case in seasonal industries.—M. C. Rorty.

[2] I question the assumption that business and professional earnings under $2,000 are comparable to wages. Frequency curves are probably quite different.—M. C. Rorty.

There is a considerable chance of error in the numbers attributed to each occupational group. Each person is placed by the Census in that group which he considers his regular occupation. But there is of necessity a large amount of shifting, both from seasonal causes and from variations in the activity of different industries. Such shiftings, however, will affect the total wages of all the groups less than the wages assigned to each group. For the total will only be affected as the average amount of wages varies from group to group. This error is probably not of momentous importance, for it will tend to raise the total as often as to lower it.

The main sources of information for each of the leading groups recognized in the estimate are as follows:—

(1) Mining. The estimated number engaged in mining is based on actual figures for approximately 93 per cent [1] of all mines in 1911 to 1918 as reported by the Bureau of Mines. After careful comparison of the numbers reported in metal mines, coal mines and quarries by the *Census of Mines and Quarries*, 1909, by the *Occupation Statistics* of 1910, and by the Bureau of Mines, 1911 to 1918, an estimate was made for 1910. These figures represent the number employed in mines during operation, which is unquestionably somewhat higher than the average number employed during the entire year.[2] It is believed that when these figures have been combined with average annual wages from sample states (Pennsylvania, Kansas, Michigan, Illinois, West Virginia) based on the data for the whole country given by the *Census of Mines and Quarries*, 1909, the resulting total wage is higher than it should be. A slight reduction has accordingly been made on the basis of the number of days which mines were closed down. Figures for the number of days in operation are available for coal mines, and for some other fields, but fluctuations are so violent and so erratic that the data cannot be used as samples for all mines. Average wages in certain metal mining companies, which were made available to the Bureau, were also consulted for the purpose of checking the general accuracy of the results obtained.

(2) Manufacturing. The data for the number employed, upon which the estimates in the manufacturing group are based, were obtained from the *Census of Manufactures* (1909, 1914 and 1919) and reports of the statistical bureaus or labor departments of five states: Massachusetts, New Jersey, Michigan, New York and Wisconsin. An index was made for these sample states, checked by means of the *Census of Manufactures* in 1909, 1914 and 1919. This index number was used in interpolating the number of men at work in the non-census years. The same sources and in addition, the labor reports of Kansas, Ohio and Pennsylvania were consulted with

[1] See note b, Table 23 D.

[2] Several states report the average numbers of men employed in mines during the year, but these samples are too small to be of much use.

regard to average wages. Wages of certain special groups, such as textile, steel, and shipyard workers, and mechanics and carpenters employed by railroads, were taken into consideration for the purpose of checking the general results. It will be seen that from the abundance of material given in the exact form desired—that of average annual wages and average number employed—it was possible to construct a fairly adequate estimate of the trend of aggregate earnings in this field.

(3) Transportation. In chapter 8, in Part I, Mr. King estimates the average number of persons employed by steam railroads, street and electric railways, express, telephone and telegraph companies. These figures are based on data from the Interstate Commerce Commission and the Census, and comprehend a major part of those employed in transportation. An index number was made from the totals and applied to the number reported in the *Occupation Statistics* of 1910 after 6 per cent had been subtracted for unemployment. This per cent is a rough approximation, little material of adequate character being obtainable for an accurate estimate. Wages data also are given for the above classes of employees by the Interstate Commerce Commission and Census. Average annual wages for teamsters and drivers in Ohio and Michigan, for railway mail clerks, and scattered data on rates of pay of employees in water transportation were studied with a view to covering those occupations not included by the Interstate Commerce Commission. It will be seen that the data available are varied and fairly comprehensive, so that the conclusions reached regarding total wages for transportation should contain a minimum amount of error.

(4) Trade. Owing to the fact that there are no figures upon which to base an estimate of the numbers engaged in trade, this section is particularly unsatisfactory. The assumption was made that unemployment in 1910 would cover only the portion of those engaged who were earning wages (clerks in stores, etc.) and not those deriving their income from profits (retail dealers, etc.). Three per cent therefore was used to reduce the number attached to this group to the average number employed. The assumption was also made that in regard to the number employed, trade resembled manufactures more closely in its general movement than any other group, as the clerk in a store is more likely to become a factory worker than a farm hand, or railroad worker. However, the unprecedented increase in manufactures owing to the war was probably not paralleled closely in trade and therefore, a composite figure was used for the years after 1910. This figure was made by applying the ratio of persons engaged in trade to the total population in 1910 and to the population of succeeding years, with corrections for the business cycle and the war.

The weighted average of all wages, with the exception of the army, has

been used as the average wage of this group. This figure seems to be reasonable, in that it is slightly above average earnings in manufacturing and below average earnings in mines and transportation. Reference to Table 27C will show that the manufacturing group contains about the same proportion of women as the commercial group; but the number of independent workers is less, so that a somewhat lower average income appears justified. On the other hand, the mining and transportation groups contain only a small percentage of women, so that we may look for a relatively high average wage in these groups.

(5) Public Service. In the public service group, the increase in the number employed was assumed to be at the same rate as that of the Fire and Police Departments of six cities (St. Louis, New York, Boston, Charleston, S. C., Washington, D. C., Chicago, and Baltimore). As unemployment plays little or no part in this group, the offices being largely fixed in number and kept filled by election or appointment, the number reported by the *Occupation Statistics* for 1910 was used for that year without any reduction. An examination of Federal and state reports shows that there have been few increases in salaries during the decade in the case of officials, and as their salaries are for the most part over $2,000, they do not need to be considered in this section. The trend of annual average salaries of Fire and Police Department employees was considered to be representative of the remaining occupations in this group. The actual figures, however, have been somewhat reduced in order to take into consideration lower grade employees such as watchmen and laborers. Owing to the fact that Public Service employees are largely classified under a variety of heads (Clerical, Professional, etc), the total salaries paid to all Federal, state, county and city employees are useless for the present purpose. As separate data for the salaries paid in each occupation are difficult to segregate, the final figures for this group must necessarily be rough approximations.

(6) Professional Service. The occupations included under professional service form a long list of heterogeneous professions, teachers being about one-third of the whole. Ministers, doctors, dentists, engineers, actors, musicians are among the more important professions included. The average numbers so engaged have been estimated with the aid of the number of teachers as reported by the Bureau of Education, the number of doctors published in the biennial register of the American Academy of Physicians and Surgeons, and the number of ministers given in the *Census of Religious Bodies*, 1906 and 1916. The numbers of Federal judges and attorneys,[1] and of physicians in public health work or resident in prisons

[1] Letter from the Department of Justice and state Reports of Treasury and Labor Departments.

and reformatories have remained approximately constant. Samples of salaries exist for several professions, although they cannot be taken as typical of the whole group without considerable adjustment. Those used in Table 23G are therefore approximations arrived at from careful study of teachers' and ministers' salaries as reported by the Federal Government and from smaller samples of the salaries of college professors, engineers and professional men in government employ.[1]

(7) Personal Service. No data except those provided by the Census exist from which to estimate the average number employed in Domestic and Personal Service. The group includes about one million domestic servants, the other two and a half million being widely scattered among barbers, laundry workers, watchmen, bartenders, restaurant workers, hotel-keepers, and other minor occupations. The numbers reported in the *Occupation Statistics* of 1910 were reduced by 6 per cent to cover estimated unemployment; a preliminary estimate of the Census Bureau supplied the corresponding number in 1920. The intervening years were interpolated. In the years 1916, 1917, 1918 and 1919, adjustment was made for the number who enlisted or were drafted into the army and navy, and for shifts into manufacturing. This estimate was made on the basis of the per cent of domestics in Class I of men registered for military service to the total number of Class I,[2] given by the Provost Marshal General for 1918 and applied to the average number in the army and navy in each of the war years. Annual average wages for some of the occupations of this group are given at odd intervals. Especially useful have been the data on laundry workers in Massachusetts each year, and in the District of Columbia for 1909, 1914 and 1919; and the data for restaurant workers in Michigan are reported from 1909 to 1918. Aside from this, the material available is in the form of rates of pay in isolated years for individuals or small groups, which are useful only as a check. While the data are meager and the method necessarily faulty, the evidence indicates that as a whole earnings of this group have increased more slowly than any other and that it is the lowest paid.

(8) Clerical Occupations. Consecutive material for an adequate estimate of the average number engaged in clerical occupations is entirely lacking. The number as given in the *Occupation Statistics* of 1910 was therefore reduced by 6 per cent to account for unemployment in that year. A preliminary estimate from the Census Bureau supplied the number in 1920. The intervening years were interpolated, and adjustments

[1] This method is likely to give an underestimate. The newer business professions are likely to be unreported. For illustration—the income of accountants in practice on their own account or in the employ of larger firms and receiving under $2,000 each would probably total $10 to $20 million. There has been a rapid increase in the law and all professions closely associated with business.—J. E. Sterrett.

[2] Second report of Provost Marshal General, 1918.

made for the war based on the reports of the Provost Marshal General. The per cent of unemployment is only an approximation, but has some basis in that it is the same as that used in transportation and manufacturing where a large number of clerks are employed. However, the increase in the number of clerks in manufactures (*Census of Manufactures*) from 1909 to 1914 was somewhat high owing to a change in the grouping of manufacturing employees and hence could not be used as a check. The pay of clerks in railroads [1] and in shipbuilding,[2] although they could cover only a very small portion of the whole, were found to check with the figures used.

The group has as its largest division a miscellaneous class of "Other Clerks," but it also includes bookkeepers, accountants, agents, stenographers, and messengers. For the latter occupations, we find a considerable amount of wages data of a scattered nature, including various government investigations, the figures for office clerks in factories in Michigan, for clerks in railroad transportation in all years, and in manufactures in 1909 and 1914. Other States report isolated average wages for particular years, which help to check the general accuracy of the results shown. A large proportion of comparatively skilled workers is included, so that the average wages should be relatively high in comparison with those in the other occupational groups.

(9) Army and Navy. The Army and Navy is numerically of small importance with the exception of the years 1917, 1918 and 1919. For these years, monthly figures published by the War and Navy Departments, have been used to determine the average number employed during those years. The pay has been estimated from reports of the War and Navy Departments for enlisted men, with about $200 per year added for food, clothing and shelter.

Nothing has been said as yet of the number of persons engaged in agriculture. The number of farm laborers, including wives and children of farmers working on their home farms, is so uncertain that it is left for treatment under the separate section on farm laborers.

Since the total number of persons having incomes over $2,000 has been estimated in the preceding chapter, it is necessary only to subtract the numbers there shown from the total gainfully employed in order to arrive at the number having incomes under $2,000. A rough classification of persons with incomes over $2,000 according to the groups used in this section may be made from certain tables shown in the official *Statistics of Income*. The tables are entitled *Distribution of Incomes by Occupations*

[1] Interstate Commerce Commission, *Statistics of Railroads*, 1909 to 1918.
[2] *Census of Manufactures*, 1909 and *Census of Shipbuilding*, 1914, 1916.

in 1916 and *Income Reported from Business Pursuits by Industries*, in 1917 and 1918.[1] While these tables are not strictly comparable, and considerable adjustment has to be made in order to fit them into the classification here used, the general results obtained from the two sources are fairly consistent with each other. Again, it may be pointed out that the total is probably more accurate than the parts. These estimates are shown in Table 23E.

Table 23F shows the numbers left after subtracting persons having incomes over $2,000 in each group from the total average number in that group. It will be noted that the number of persons having incomes of less than $2,000 shows decreases in the war years in some groups. These decreases arise from the fact that many persons in these years rose into the group having incomes over $2,000. In the summary (Chapter 26) these changes in the distribution of income will be considered.

The final results have been subjected to a number of tests. The number gainfully employed has been estimated for each year and checked by advance information for 1920 from the Census Bureau.

The Provost Marshal General made a similar projection of the gainfully employed in 1917,[2] arriving at a total of 28,751,419, excluding farmers and farm laborers, which checks well with the figure presented for that year (29,230,000). The number actually employed in 1917 as well as in 1918 and 1919, was larger than was indicated by the projection which the Provost Marshal used, owing (1) to a shift from agriculture into industry and the army; (2) the inclusion of college students and normally idle persons in the army; and (3) the temporary employment, at wages, of housewives and other women not usually counted among the gainfully employed.

With regard to wage movements, the weighted average of wages was computed for each year, and converted into an index number on the base 1913 = 100. This series may be compared with the index number for wages published by the Bureau of Labor Statistics. In making this comparison, one should bear in mind what the Bureau of Labor Statistics has said about its own figures: "The Bureau has hesitated to attempt the preparation of such a wage index because of the incomplete and disconnected material available for its construction. However, an index number has been prepared by the Bureau from all sources accessible, and is here presented." The agreement of the results arrived at in these independent investigations corroborates their general accuracy. (Table 23B)

The division of the industrial groups according to age and sex is a vital factor in judging the relations among average wages ascribed to each. Table 23C has been prepared from the *Census of Occupations* of 1910

[1] *Statistics of Income*: 1916, p. 31; 1917, p. 16; 1918, p. 11.
[2] Second Report of the Provost Marshal General, December 20, 1918, p. 407.

TABLE 23B

COMPARISON OF THE INDEX NUMBER OF WAGES MADE IN THIS STUDY WITH THAT OF THE BUREAU OF LABOR STATISTICS

1910 to 1920

	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920
Weighted average [a] (Dollars)	595	607	623	637	643	666	708	807	1003	1145	1321
Index number (1913=100)	93	95	98	100	101	105	111	127	157	180	207
Index number of Bureau of Labor Statistics [b] (1913=100)	93	95	97	100	102	103	111	128	162	184	

[a] Computed by dividing total amount of earnings in Table 23H by total numbers of persons, Table 23F, excluding Army and Navy.

[b] *Monthly Labor Review*, February, 1921, p. 74; 1919 figure applies to the spring of 1919.

and is presented to aid readers in canvassing the reasonableness of the results reached in this investigation.

TABLE 23C

PERCENTAGE DIVISION ACCORDING TO AGE AND SEX OF THE NUMBER GAINFULLY EMPLOYED IN EACH INDUSTRIAL GROUP [a] IN 1910

(Clerical help included)

Group	I	II	III	IV	V
	Percentage of males		Percentage of females		Total
	Over 20 years of age	Under 20 years of age	Over 20 years of age	Under 20 years of age	
Agriculture	65.2	20.1	8.6	6.1	100.0
Mines	86.5	13.4	0.1	0.0	100.0
Manufacturing	73.7	11.1	10.6	4.6	100.0
Transportation	85.0	10.1	3.0	1.9	100.0
Trade	71.0	11.2	12.0	5.8	100.0
Public Service	91.3	4.3	3.9	0.5	100.0
Professional Service	51.2	3.3	37.9	7.6	100.0
Personal Service	28.8	3.5	53.1	14.6	100.0

[a] *Occupation Statistics*, 1910, Table VI, pp. 302 ff.

With these explanations, the five tables described in the preceding text are now presented. The sources from which the data were taken are shown in the appended footnotes.

TABLE 23D

THE AVERAGE NUMBER OF PERSONS ACTUALLY EMPLOYED BY OCCUPATION DIVISIONS

(Excluding Agriculture)

1910 to 1920

(Millions of Persons)

Occupation Divisions	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920
Total	24.38	24.90	25.35	25.61	25.39	25.43	28.16	29.23	31.41	30.00	29.60
Extraction of Minerals	1.10[a]	1.10[b]	1.10	1.14	1.10	1.08	1.11	1.13	1.06	1.10	1.03
Manufacturing and Mechanical Industries	9.96[c]	10.16	10.25	10.35	10.25[d]	10.09	12.38	12.93	13.19	12.98	13.11
Transportation	2.48[e]	2.52	2.62	2.62	2.43	2.40	2.63	2.75	2.90	2.99[f]	2.92
Trade	3.52[g]	3.66	3.80	3.77	3.73	3.83	3.86	3.96	4.03	4.00	4.12
Other Public Service (except Army and Navy)	.32[h]	.33	.33	.34	.34	.35	.35	.35	.35	.37	.40
Professional Service	1.67[i]	1.70	1.73	1.77	1.80	1.85	1.92	1.80[j]	1.80	1.90	2.15
Personal and Domestic Service	3.55[k]	3.61	3.67	3.74	3.82	3.81	3.77	3.56[l]	3.20[l]	3.24[l]	3.20
Clerical Occupations	1.64[m]	1.68	1.70	1.73	1.76	1.85	1.94	2.03	2.16	2.22	2.30
Army and Navy	.14[n]	.14	.15	.15	.16	.17	.20[o]	.72[p]	2.72[q]	1.20[r]	.37[s]

[a] The figure for 1910 is made up of (a) coal miners (725,030) reported by the U. S. Geological Survey, *Mineral Resources*, 1914, Part II, p. 615; (b) wage-earners in metal mines, quarries and all other mines (348,455) reported by *Occupation Statistics*, 1910, pp. 91, 304, 312, decreased by 5 per cent, which is the difference between the average number and the highest number employed in 1909 (*Census of Mines and Quarries*, 1909, p. 332). The number in manufacturing closely allied to mining was included in order to have the figure for wage-earners in metal mines, etc., comparable with that for coal miners in 1910 and with the number in coal, metal mines and quarries reported by the Bureau of Mines, 1911 to 1918. This correction was made after careful study of the *Census of Mines and Quarries*, 1909, *Occupation Statistics*, 1910, and the reports of the Bureau of Mines; and (c) number of operators and officials, etc., *Occupation Statistics*, 1910, p. 91.

[b] (a) The actual numbers of coal miners, metal miners and quarrymen, 1911 to 1918, were reported as follows: Bureau of Mines, *Coal Mine Fatalities*, compiled by A. H. Fay for 1915, 1916, 1917, 1918 and Geological Survey, *Mineral Resources*, 1914, Part II, p. 615, for coal miners; Bureau of Mines, Technical Papers, Number 252, p. 8, for metal miners, and Number 213, p. 44, for quarrymen. The number of coal miners, metal miners and quarrymen reported in 1909 was found to be 93 per cent of all miners, *Census of Mines and Quarries*, 1909, p. 335. The number of all miners was computed on this basis for the years 1911 to 1918. (b) The same figure for oper-

ators reported in 1910 was used in 1911, and this was projected for the years 1912 to 1918 by applying an index of the number of operators of metal mines and quarries. (Bureau of Mines, Technical Papers, Number 252, p. 8; Number 128, p. 16; Number 213, p. 6.) (c) The same number of officials reported in 1910, *Occupation Statistics*, p. 91, was used throughout. These figures were brought down to 1920 with aid of the preliminary *Occupation Statistics* for 1920.

[c] The number in manufacturing and mechanical industries, reported in *Occupation Statistics*, 1910, p. 91, and adjusted to June 30th, is 10,700,000. This figure has been reduced by an estimated number of 100,000, included in mining [see note *a* (b)] and in the Army and Navy (see note [n]); and then by 6 per cent—the difference between the average number and the highest number employed as reported in the *Census of Manufactures*, 1909, p. 277. The number for the years 1910 to 1914 inclusive has been computed by using an index of the total number employed in Massachusetts, (Bureau of Statistics, *Annual Report, Statistics of Manufactures*, 1909 to 1914), New Jersey (Department of Labor and Industry, Bureau of Statistics, *Annual Report*, 1909 to 1914), and Michigan (Department of Labor, *Annual Report*, 1909 to 1914). The amounts so found were adjusted for the entire country by the increase in manufactures as reported in the *Census of Manufactures, Abstract*, 1914, p. 427.

[d] The average number employed for the years 1914 to 1919 was computed by aid of an index of the total number employed in Massachusetts (see above), in New York (Industrial Commission, *Labor Market Bulletin*, 1914 to 1920, average of monthly figures made for each year and adjusted to base 1914), and in Wisconsin (Industrial Commission, Bureau of Statistics *The Wisconsin Labor Market Bulletin*, chart in December, 1920 was adjusted to a base comparable to New York, and used for comparative purposes.) These intervening years were then adjusted in conformity with the recently published preliminary *Occupation Statistics* of 1920.

[e] The total number actually at work (as estimated in Chapter 8, Part I) in street railways, steam railroads, switching and terminal, telegraph and telephone companies, and water transportation and also the number of railway mail clerks (*Statistical Abstract*, 1919, p. 313) and mail-carriers (*Report of the Postmaster General*, 1919, p. 157) was made into an index number and applied to the total number reported in transportation in 1910 (*Occupation Statistics*, p. 92), adjusted to June 30th, and cut down 6 per cent. for estimated unemployment. These estimates are based on the Bureau of the Census, *Central Electric Light and Power Stations* and *Street and Electric Railways*, 1912; Census of Electrical Industries, *Electric Railways*, 1917; the Interstate Commerce Commission reports on *Statistics of Railways* and *Express Companies;* Bureau of the Census, *Transportation by Water*, 1906 and 1916; Bureau of the Census, *Telephones*, 1912 and *Telegraphs*, 1912, and Census of Electrical Industries, *Telephones*, 1917, and *Telegraphs*, 1917.

[f] The only figures available for 1919 are the number of railroad employees which show an increase of 3.5 per cent over 1918, Bureau of Railway News and Statistics, *Railway Statistics*, 1919, p. 61. The figure for 1920 is adjusted to the preliminary *Occupation Statistics* of 1920.

[g] The number in trade reported in the *Occupation Statistics*, 1910, p. 93, was adjusted for June 30th, and decreased by 3 per cent (estimated per cent due to unemployment of certain classes included in this group). The per cent of this number to the total population was found for 1910 and was applied to the estimated population each year; and further adjusted by means of the index used for manufactures. It was then tied to the recently published preliminary *Occupation Statistics* of 1920.

[h] The number in Public Service (except Army and Navy) is taken from the *Occupation Statistics*, 1910, p. 93, and reduced by 3 per cent for unemployment. An index number of policemen and firemen was used to estimate the numbers in succeeding years. In computing this index number, the following data were used: New York City Fire Department, *Annual Report*, 1909 to 1918; Chicago Fire Department, *Report of Fire Marshal*, 1909 to 1919; Boston, Mass., Fire Department, *Annual Report*, 1909 to 1918; Charleston, S. C., *Report of the Board of Fire Masters*, 1909 to 1919; District of Columbia, *Repot of the Chief Engineer of the Fire Department*, 1909 to 1918; St. Louis, Missouri, from letter in our files from the Department of Public Safety, Chief, Fire Department, February 28, 1921; Bureau of Census, *Statistics of Fire Departments* of cities having a population of over 30,000, 1917. New York City Police Department, *Annual Report*, 1909 to 1917; Chicago, Ill., Police Department Report, 1918, p. 8; Mass., *Annual Report* of Police Commissioner for Boston,

1909 to 1919; Baltimore, Maryland, *Annual Report* of the Board of Police Commissioners, 1909 to 1919; St. Louis, Missouri, *Annual Report* Police Department, 1909 to 1919; Bureau of Census, *General Statistics of Cities*, 1915, Table 2 (police).

[i] The number in Professional Service reported in *Occupation Statistics*, 1910, p. 93, was adjusted to June 30th and projected after a study of the yearly increase in the reported numbers of teachers (Reports of the Bureau of Education, Department of the Interior, adjusted to the calendar year for the years 1910 to 1916 and 1918); the number of professors (Reports of the Bureau of Education, Department of the Interior, giving the number 1910 to 1916); the number of ministers (U. S. *Census of Religious Bodies*, 1916, Part I, p. 66); and the number of doctors reported biennially (Polk's *Medical Register and Directory of North America*, 1910, 1914 to 1915, and the *American Medical Directory*, 1912 and 1918, the latter volume containing the total number for 1916).

[j] Adjustment was made for an estimated number in the Army. The per cent of Class I in Professional Service as reported by the Provost Marshal General (*Second Report to the Secretary of War on the Operations of the Selective Service System* to December 20, 1918, pp. 407–416, Table 42A, Industrial Index), was applied to the average number in the Army and Navy in 1917, 1918 and 1919 and subtracted from the estimated numbers for those years in Professional Service. It was then tied to the recently published preliminary *Occupation Statistics* of 1920.

[k] The number reported in Domestic and Personal Service in the *Occupation Statistics*, 1910, p. 94, was adjusted to June 30th and decreased by 6 per cent (estimated unemployment). A preliminary estimate from the Census supplied the number in 1920. The intervening years were interpolated and adjusted for (1) a shift to clerical occupations and (2) a sharp movement to other occupations after 1917.

[l] For the years 1917, 1918 and 1919 adjustments were made for the number in the Army and Navy (for method, see note *j*) and also for a gradual shift to war industries, (Massachusetts, Bureau of Statistics, *Statistics of Manufactures*, 1917, p. l and 1918, p. liii.)

[m] The number in Clerical Occupations is reported in *Occupation Statistics*, 1910, p. 94, adjusted to June 30th and decreased by 6 per cent. A preliminary estimate from the Census Bureau supplied the number in 1920. The intervening years were interpolated, and adjusted to a slow shift from domestic service; these results were further adjusted for the years 1917, 1918 and 1919 for those who went into the Army and Navy. (For method see note *j*.)

[n] The numbers in the Army, Navy and Marine Corps for the years 1910 to 1915 are reported in the *Statistical Abstracts*, 1913, pp. 612–613 and 1915, pp. 636–637. The figure used for 1910 is approximately double that reported in *Occupation Statistics*, 1910, p. 93, owing to the fact that only those resident in the U. S. were enumerated and that men in special trades were reported as belonging to those trades and therefore to be found under manufactures, etc. (see note *c*) as explained on page 23 of the *Occupation Statistics*, 1910.

[o] *Statistical Abstract*, 1917, pp. 675, 688.

[p] The number in the Army is the average of the number reported each month for the year 1917 (*Statistical Abstract*, 1919, p. 728). For the number in the Marine Reserve and Naval Militia see *Statistical Abstract*, 1918, p. 728. The number in the Navy, Naval Reserve and Marine Corps is the monthly average for the year 1917 (*Statistical Abstract*, 1919, p. 729). For the number of the National Guard see *Statistical Abstract*, 1919, p. 727.

[q] The number in the Army and Navy, Naval Reserve and Marine Corps is the average of the number reported for the year 1918 (*Statistical Abstract*, 1919, pp. 728, 729). For the number in the Marine Reserve, Naval Militia see *Statistical Abstract*, 1918, p. 728. The number of the National Guard is estimated to be 400,000 on the basis of the total strength in April, 1917, and subsequent enlistments (*Statistical Abstract*, 1919, p. 734).

[r] For the number in the Army, see estimate in an unpublished letter from the War Department (on file). The number in the Navy, Marine Corps and Naval Reserve is the average of the number given each month in the year 1919 (*Statistical Abstract*, 1919, p. 729).

[s] The figure for 1920 was adjusted to the preliminary *Occupation Statistics* for 1920 on the same basis as 1910.

TABLE 23E

THE ESTIMATED NUMBER BY OCCUPATION DIVISIONS OF PERSONS EMPLOYED HAVING INCOMES OVER $2,000

(Excluding Agriculture)

1910 to 1920

(Millions of Persons)

Occupation Divisions	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920 [a]
Total	1.30	1.30	1.30	1.30	1.30	1.80	2.30	2.90	3.10	3.60	4.50
Extraction of Minerals	.07	.07	.07	.07	.07	.09	.11	.14	.15	.18	.22
Manufacturing and Mechanical Industries	.23	.23	.23	.23	.23	.32	.41	.51	.52	.63	.79
Transportation	.10	.10	.10	.10	.10	.14	.18	.23	.23	.28	.35
Trade	.46	.46	.46	.46	.46	.64	.83	1.03	1.05	1.26	1.58
Other Public Service (except Army and Navy)	.03	.03	.03	.03	.03	.04	.05	.06	.06	.07	.09
Professional Service	.32	.32	.32	.32	.32	.45	.57	.71	.73	.87	1.09
Personal and Domestic Service	.03	.03	.03	.03	.03	.04	.05	.06	.06	.07	.09
Clerical Occupations	.05	.05	.05	.05	.05	.07	.09	.11	.12	.14	.17
Army and Navy	.01	.01	.01	.01	.01	.01	.01	.05	.18	.10	.12

[a] Advance estimate divided on basis of 1919.

TABLE 23F

THE ESTIMATED NUMBER BY OCCUPATION DIVISIONS OF PERSONS EMPLOYED HAVING INCOME UNDER $2,000

(Excluding Agriculture)

1910 to 1920

(Millions of Persons)

Occupation Divisions	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920
Total	23.08	23.60	24.05	24.31	24.09	23.63	25.86	26.33	28.31	26.40	25.10
Extraction of Minerals	1.03	1.03	1.03	1.07	1.03	.99	1.00	.99	.91	.92	.81
Manufacturing and Mechanical Industries	9.73	9.93	10.02	10.12	10.02	9.77	11.97	12.42	12.67	12.35	12.32
Transportation	2.38	2.42	2.52	2.52	2.33	2.26	2.45	2.52	2.67	2.71	2.57
Trade	3.06	3.20	3.34	3.31	3.27	3.19	3.03	2.93	2.98	2.74	2.54
Other Public Service (except Army and Navy)	.29	.30	.30	.31	.31	.31	.30	.29	.29	.30	.31
Professional Service	1.35	1.38	1.41	1.45	1.48	1.40	1.35	1.09	1.07	1.03	1.06
Personal and Domestic Service	3.52	3.58	3.64	3.71	3.79	3.77	3.72	3.50	3.14	3.17	3.11
Clerical Occupations	1.59	1.63	1.65	1.68	1.71	1.78	1.85	1.92	2.04	2.08	2.13
Army and Navy	.13	.13	.14	.14	.15	.16	.19	.67	2.54	1.10	.25

TABLE 23G

THE AVERAGE ANNUAL EARNINGS BY OCCUPATION DIVISIONS OF PERSONS HAVING INCOMES UNDER $2,000

1909 to 1920

(Dollars)

Occupation Divisions	I 1909	II 1910	III 1911	IV 1912	V 1913	VI 1914	VII 1915	VIII 1916	IX 1917	X 1918	XI 1919	XII 1920
Extraction of Minerals..	$ 606 [a]	$ 625	$ 625	$ 675	$ 700	$ 675	$ 675	$ 850	$1,100	$1,400	$1,300	$1,300
Manufacturing and Mechanical Industries..	520 [b]	520	535	550	570	580	610	650	770	970	1,160	1,360
Transportation.....	612 [c]	630	670	684	700	717	757	789	903	1,250	1,250	1,500
Trade.....	586 [d]	595	607	623	637	643	666	708	807	1,003	1,145	1,321
Other Public Service (except Army and Navy).....	1,200 [e]	1,300	1,300	1,300	1,300	1,350	1,350	1,350	1,350	1,500	1,600	1,700
Professional Service....	900 [f]	900	900	900	900	900	900	950	1,000	1,100	1,200	1,300
Personal and Domestic Service.....	500 [g]	500	500	525	525	525	550	600	650	750	900	1,000
Clerical Occupations....	750 [h]	800	800	800	800	800	800	850	900	1,050	1,200	1,320
Army and Navy.....	500 [i]	500	500	500	500	500	500	500	600	700	700	700

[a] The average wage of miners for 1909 was computed by dividing the total wages paid in producing mines (*Census of Mines and Quarries*, 1909, p. 21) by the average number employed during the year (p. 30). This figure was projected after a study of average wages for the following States: Kansas, Bureau of Labor and Industry, *Annual Report*, 1909 to 1919 (coal); Michigan, Department of Labor, *Annual Report*, 1910 to 1918 (coal); Illinois, *Annual Coal Report*, 1909 to 1917 (wages of hand miners and machine miners); West Virginia, Department of Mines, *Annual Report*, 1909 to 1917 (wages of pick miners); Pennsylvania, Internal Affairs Department, *Annual Report*, 1909 to 1912 (coal), 1916 to 1919 (all mines), and Department of Labor and Industry, *Annual Report*, 1913 to 1915 (other mines than coal); South Carolina, Commissioner of Agriculture, Commerce and Industry, *Annual Report*, 1909 to 1917 (coal); Census Summary, December 8, 1920 for Pennsylvania, for mines and quarries giving figures for 1914 and 1919. Other sources were consulted such as Hanna and Lauck, *Wages and the War*, p. 30 (an index of contract miners' wages in anthracite, 1902 to 1918); *Monthly Labor Review*, April, 1919, p. 176 (daily rates in metal mines 1913 to 1918) and U. S. Bureau of Labor Statistics, Bulletin No. 279, *Hours and Earnings in Anthracite and Bituminous Coal Mining*. The results (though on a lower level through the inclusion of all mining) are in general accord with the indices of average annual wages paid by the Anaconda Copper Mining Company, Miami Copper Company, Calumet and Hecla Mining Company, which were furnished to the Bureau through the courtesy of these companies.

[b] The average annual wage paid in manufacturing for 1909, 1914, and 1919 was based on the *Census of Manufactures*, 1909, 1914

and preliminary reports of the *Census of Manufactures*, 1919 for eleven States. For the intervening years, studies were made of wages in the labor reports of the following States: Massachusetts, Bureau of Statistics, *Statistics of Manufactures*, 1909 to 1918; New Jersey, Department of Labor and Industry, Bureau of Statistics, 1909 to 1915; Kansas, Department of Labor and Industry, 1909 to 1914; Michigan, Department of Labor, 1909 to 1918; Ohio, Bureau of Labor Statistics, 1909, 1910, 1911; South Carolina, Commissioner of Agriculture, Commerce and Industry, *Annual Report*, 1909 to 1918; West Virginia, Bureau of Labor, *Biennial Report*, 1909 to 1917; Wisconsin, Industrial Commission, Statistical Department. *Wisconsin Labor Market Bulletin*, December, 1920 (index of total wages and weekly wages, 1915 to 1920); New York (State) Industrial Commission, *Labor Market Bulletin*, 1914, 1920 (an index of weekly and total earnings).

Other sources used were: U. S. Steel Corporation, *Annual Reports*, 1912 to 1919; Bethlehem Steel Corporation, *Annual Report*, 1919, p. 12 (figures for 1911 to 1919); *Monthly Labor Review*, February, 1920, p. 117 (union wage rates per hour, 1909 to 1919); *Census of Ship Building*, 1914 and 1916, including figures for 1909; U. S. Shipping Board, *3rd Annual Report*, June 30, 1919 (wages for 1914, 1918 and the early part of 1919).

[c] The following sources were studied in order to estimate wages paid in transportation:

For street railways: Bureau of Census, *Central Electric Light and Power Companies, Street and Electric Railways*, 1912, p. 269; Bureau of Census, Census of Electrical Industries, *Electric Railways*, 1917.

For railroads: Interstate Commerce Commission, *Statistics of Railways*, 1909 to 1918; figures for Class I railroads were studied after salaries of clerks, engineers, draftsmen, carpenters, mechanics, and telegraphers had been subtracted. These figures were roughly $50 lower for each year than those for all employees of Class I railroads. The Bureau of Railway News and Statistics, *Railway Statistics*, 1919, p. 59, gives averages wages for 1919.

For switching and terminal companies: See Part I of the present volume, Chapter 9, Table 9I.

For telephones: Census of Electrical Industries, *Telephones*, 1917, p. 45; and *Statistical Abstract*, 1919, pp. 322, 324, 325.

For telegraphs: Bureau of Census, *Telephones and Telegraphs*, 1912, p. 159; Bureau of Census, Census of Electrical Industries, *Telegraphs*, 1917, p. 12; and *Statistical Abstract*, 1919, p. 322.

For water transportation: Bureau of Census, *Transportation by Water*, 1916, p. 59; and *Monthly Labor Review*, November, 1920, pp. 90, 91, monthly rates for captains 1917 and 1920.

For railway mail clerks: *Statistical Abstract*, 1919, p. 313.

For mail carriers: Report of the Postmaster General, 1917, p. 29; 1918, p. 24; 1919, pp. 61 to 157.

For teamsters: Ohio, reports of Bureau of Labor Statistics, 1909 to 1911 (in cities): Michigan, Department of Labor, individuals working for state prison, 1910 to 1918.

[d] A weighted average wage for all persons employed having incomes under $2,000 (except those in the Army and Navy) was used for Trade, since no data were available beyond a few scattered references to average wages for salesmen in Virginia and Ohio, storekeepers as given by state prisons in Michigan, insurance agents employed by the government, and daily wages for women in mercantile pursuits in Kansas and Ohio. This average wage was found by dividing the total wages paid all persons in Table 23H less groups 4 and 9, by the total number of persons in Table 23F less groups 4 and 9.

[e] See note [h] of Table 23D for references to Police and Fire Departments. Salaries of officials were studied in Indiana, *Report of the Treasurer*, 1909 to 1916, and *Yearbook*, 1917 and 1918; Wisconsin, *Report of the Treasurer*, 1909 to 1916, *Blue Book of Wisconsin*, 1915 to 1917; United States Treasury Department, Division of Bookkeeping and Warrants, *Estimates of Appropriation*, 1911 to 1920; New York State Comptroller *Annual Reports*.

[f] The following material was consulted in estimating the average earnings of the professional group:

For professors: *School and Society*, Vol. 5, p. 266, and p. 378, and Department of Interior, Bureau of Education, Bulletin 1920, No. 20, *Salaries in Universities and Colleges in 1920*.

For teachers: in Public Schools for the school years 1909 to 1916, and 1918, Reports of U. S. Bureau of Education; W. R. Burgess, *Trends of School Costs*, N. Y. Russell Sage Foundation, 1920; Bureau of Applied Economics, *Wages in Various Industries*, p. 47 (salaries for 1910, 1915 and 1918).

For ministers: U. S. *Census of Religious Bodies*, 1916; *Methodist Year Book*, 1920, p. 61 (annual salaries from 1909 to 1919).

For engineers: N. Y. State Bureau of Municipal Information, *Report*, number 27, 1916; Engineering Council, *Report of Committee on Classification and Compensation of Engineers*, December 15, 1919.

For attorneys: New York State Comptroller, *Annual Reports;* N. Y. State Bureau of Municipal Information, *Reports* 55 and 118, 1917.

For judges: *Indiana Yearbook*, 1919; N. Y. State Bureau of Municipal Information, *Report Number 32* (largely over $2,000), 1917.

Articles giving amounts earned in special investigations according to age or length of time out of college were also consulted. Wm. de Witt Hyde, *The College Man and the College Woman*, 1906, p. 221 (Bowdoin College graduates engaged in law, medicine, ministry, education, journalism, business, banking, and government service); *Scientific American*, Vol. 109, August 9, 1913, p. 116, Dr. David E. Rice, *Study of Incomes of Technically Trained Men* (mechanical, electrical and chemical graduates of Pratt Institute, Brooklyn); *Harvard Law Review*, Vol. 27, p. 260.

g The following material was consulted in estimating the average earnings for personal service:

For domestic workers: Minnesota, Bureau of Labor, *Biennial Report*, 1910, monthly wages; Michigan, Department of Labor, *Annual Report*, individuals employed by state prison, 1910 to 1918.

For charwomen: U. S. Treasury Department, Division of Bookkeeping and Warrants, *Estimates of Appropriations*, 1910 to 1918.

For laundry workers: U. S. Census of Manufactures, 1909, 1914 and press summary 1919 for District of Columbia; Massachusetts, Bureau of Statistics, *Statistics of Manufactures*, 1910 to 1918; Michigan Department of Labor, *Annual Report*, 1910 to 1918, prison statistics.

For restaurant workers: Michigan, Department of Labor, *Annual Report*, daily wages, 1913 to 1918.

For elevator tenders: *Congressional Record* 65:2, vol. 56, p. 5129, April 16, 1918. Senator Smoot's table, average annual salaries 1914 and 1918, male and female, for federal, commercial and state employees.

h The following documents were consulted in arriving at an estimate for clerical earnings:

Ohio, Bureau of Labor Statistics, *Annual Report*, 1909 to 1911 monthly wages of stenographers, clerks, bookkeepers; *Congressional Record*, 65:2, vol. 56, p. 5129, April 16, 1918, for 1914 and 1918 male and female, federal, commercial and state employees; Virginia, Bureau of Labor and Industrial Statistics, *Annual Reports;* U. S. Treasury, *Report of Finances*, 1910 to 1919, Report of Collector of Internal Revenue, samples of messengers, janitors, clerks; U. S. Division of Bookkeeping and Warrants, *Estimates of Appropriations*, Class 1, 2, 3 and 4, clerks; Indiana, Treasurer's report, 1909 to 1916. These figures were checked by comparing results with data received confidentially from a number of banks and corporations.

i Actual average annual amounts of pay received by enlisted men in the Navy in 1917 and 1918 were found (*Navy Yearbook*, 1918, pp. 831 to 838, 866 to 874) and monthly rates of pay in the Army (Bureau of Applied Economics, *Wages in Various Industries and Occupations*, pp. 8, 9, for 1908 to 1917 and 1917 to 1919) for each grade. The latter were then weighted by the number of men in each grade taken from the U. S. *Official Register*, 1910 and 1916. This method gives a more accurate basis for an estimate than the total amount of pay reported each year for the entire army which includes pay of retired officers, clerical help in staff offices, etc. To the estimated amount of pay to enlisted men in the Army and Navy each year was added an allowance for board and clothes of $200 per year.

TABLE 23H

THE TOTAL EARNINGS BY OCCUPATION DIVISIONS OF PERSONS HAVING INCOMES UNDER $2,000

(Excluding Agriculture)

1910 to 1920

(Millions of Dollars)

Occupation Divisions	I 1910	II 1911	III 1912	IV 1913	V 1914	VI 1915	VII 1916	VIII 1917	IX 1918	X 1919	XI 1920
Total	$13,711	$14,311	$14,971	$15,458	$15,462	$15,717	$18,294	$21,179	$27,777	$29,882	$33,020
Extraction of Minerals	644	644	695	749	695	668	850	1,089	1,274	1,196	1,053
Manufacturing and Mechanical Industries	5,059	5,313	5,511	5,768	5,811	5,960	7,781	9,563	12,290	14,326	16,755
Transportation	1,499	1,621	1,724	1,764	1,671	1,711	1,933	2,276	3,337	3,387	3,855
Trade	1,820	1,942	2,081	2,107	2,102	2,123	2,144	2,365	2,989	3,138	3,355
Other Public Service (except Army and Navy)	377	390	390	403	418	418	405	391	435	480	527
Professional Service	1,215	1,242	1,269	1,305	1,332	1,260	1,282	1,090	1,177	1,236	1,378
Personal and Domestic Service	1,760	1,790	1,911	1,948	1,990	2,073	2,232	2,275	2,355	2,853	3,110
Clerical Occupations	1,272	1,304	1,320	1,344	1,368	1,424	1,572	1,728	2,142	2,496	2,812
Army and Navy	65	65	70	70	75	80	95	402	1,778	770	175

§ 23c. The Earnings of Farm Laborers

The Census for 1910 places the number of farm laborers at 6,390,000,[1] and estimates that $651,611,287 [2] was expended by farmers for labor. These figures would yield the rather absurd average annual wage of $102 for each farm laborer. Inquiry has developed the fact that among farm laborers are included those wives and children of farmers who work only at irregular intervals, and often for only a few days. The Census uses the terms "home farm" and "working out" in subdividing farm laborers. There are reported under the title "home farm," 3,310,000 persons of whom 2,216,000 are under twenty years of age. Of those over twenty years, 563,000 are women, leaving only 531,000 males over twenty years old in the home-farm group. These laborers appear to be mainly sons working with their fathers, and their earnings are probably included as part of the general income of the farm.

There are left therefore, as independent income receivers 3,080,000, of whom 2,637,000 are laborers "working out," and 443,000 are under special classifications. Of the entire group, 274,000 are under sixteen years of age, and 350,000 are women. Even after the numbers are reduced in this way, when they are taken in conjunction with the $652 million paid out by farmers, we still have the low average wage of $212.

The total amount paid by farmers for labor is generally accepted by qualified judges as approximately correct. It was compiled by asking each farmer what sum he paid out for labor. The number of farms and acreage under cultivation remained approximately the same throughout the decade, so that the assumption is made that the amount of hired help remained about the same.[3] The only item of change, then, is in the rate of monthly pay without board, which is taken as typical of the movement of wages. These reports give the average wages of a large number of reporting districts and their accuracy is only approximate.

While the amounts shown in Column III of table 23I are all that were paid by farmers, yet it is clear that more than this must have been earned by those who were classed as agricultural laborers. The group of 3,080,000 who worked out probably earned at least an average of $400 per year. The best conjecture available is that about one-quarter million laborers are hired by the year, some one and one-half million by the month for a period of three to seven months, and about a million more are employed by the day. Conditions in different parts of the country vary so greatly that estimates based on any locality must be accepted with reservations, and

[1] Bureau of the Census, *Occupation Statistics*, p. 302 ff. includes agricultural laborers, other agricultural pursuits and other occupations under forestry and animal husbandry.

[2] *Abstract of the Census*, 1910, p. 372.

[3] In 1920, this preliminary *Occupation Statistics* indicate slightly under three million independent income receivers, as against slightly over three million in 1910.

these numbers are given only as rough approximations. The month and day laborers ordinarily find some other occupation during the winter to supplement their wages from the farm.

The total earning capacity of this group in 1910 must have been in the neighborhood of one to one and a quarter billions, of which only $652 million was received in money from farmers. It is not unreasonable, therefore, to add $500 million for 1910 to the $652 million in order to arrive at total earnings.[1] This assumption imputes a lower earning power to farm laborers than to any other class, which is in accord with what seem to be the facts. A similar amount, increased in proportion to the general wage level, has therefore been added to the estimate of farm laborers' income for each subsequent year. The amount for 1920 has, however, been increased to allow for the return of 250,000 men from the army to farm labor, and their rate of pay is added. This increases the proportionate amounts shown for 1920 by 1/12 (3,080,000÷250,000).

TABLE 231

ESTIMATED EARNINGS OF FARM LABORERS

1910 to 1920

(Millions of dollars)

Year	I Monthly wages without board [a]	II Relative pay	III Total wages from farm labor [b]	IV Other earnings [c]	V Total earnings of farm laborers
1910	$27.50	100.0	$ 652	$ 500	$1,152
1911	28.77	104.6	682	511	1,193
1912	29.58	107.6	701	527	1,228
1913	30.31	110.2	718	538	1,256
1914	29.88	108.7	708	543	1,251
1915	30.15	109.6	714	565	1,279
1916	32.83	119.4	778	597	1,375
1917	40.43	147.0	958	683	1,641
1918	48.80	177.5	1,157	844	2,001
1919	56.29	204.7	1,334 [d]	968	2,302
1920	64.95	236.2	1,668	1,110	2,778 [e]

[a] *Statistical Abstract*, 1920, p. 303.

[b] $651,611,287, *Abstract of the Census*, 1910, p. 372, projected by index in Column II.

[c] $500 million in 1910 projected by index of wages.

[d] The recently published Summary of the 1919 Census of Agriculture places the amount expended by farmers for labor at $ 1,356,403,452.

[e] For explanation see text.

[1] Duplication of wages actually earned in other industries, to which farm laborers turn in winter, is avoided because of the fact that they are not enumerated in those industries. There is no error in the total; but there is a certain amount of error in the manner in which the earnings are divided between industries.

§ 23d. Pensions

Pensions of the Federal, State, and City governments may be credited entirely to persons having incomes under $2,000. The Commissioner of Pensions reports annually the amounts paid for Federal pensions; state pensions are reported in the *Financial Statistics of States;* and city pensions are reported in the *Financial Statistics of Cities.* Both of these volumes are issued by the Census Bureau at irregular periods, so that figures for intermediate years have been interpolated. Other forms of pensions, received from corporations and lodges, are incapable of determination; but they appear to be so small a factor in the total that they may safely be disregarded.

TABLE 23J

FEDERAL, STATE AND CITY PENSIONS

1910 to 1920

(Millions of dollars)

	I Federal [a]	II State	III City	IV Total
1910	$159.9	$ 8.4 [b]	$ 6.8 [b]	$175.1
1911	157.3	9.7 [b]	7.6 [d]	174.6
1912	152.9	11.0 [b]	8.5 [d]	172.4
1913	174.1	12.3 [b]	9.2 [b]	195.6
1914	172.4	13.6 [b]	9.9 [b]	195.9
1915	165.5	14.9 [c]	10.6 [d]	191.0
1916	159.1	16.1 [c]	11.6 [b]	186.8
1917	160.8	17.3 [b]	12.7 [d]	190.8
1918	179.8	18.6 [c]	13.5 [d]	211.9
1919	222.2	20.2 [c]	14.3 [b]	256.7
1920 [e]	....	....	...	....

[a] *Annual Reports* of the Commissioner of Pensions.
[b] Interpolated.
[c] U. S. Census, *Financial Statistics of States* (1915, p. 90; 1916, p. 92; 1918, p. 90; 1919, p. 84).
[d] U. S. Census, *Financial Statistics of Cities* (1911, p. 191; 1912, p. 201; 1915, p. 193; 1917, p. 207; 1918, p. 191).
[e] Data not available.

§ 23e. The Rental Value of Homes Owned by Their Occupants

The Census of 1910 reports the number of homes, excluding farm homes (which are taken up in Chapter 24 under farmers' incomes), as 14,131,945.[1] Of these, 3,408,854 were owned unencumbered, 1,701,062 were owned encumbered, and 135,464 were not reported in regard to the question of

[1] *Census of Population,* 1910, p. 1294.

encumbrance. The remaining eight million homes were presumably rented, and the income accruing from these rentals is included under other headings. Owing to the lack of later information, it has been necessary to assume for purposes of computation, that the number of homes owned increased since 1910 in the same ratio as the general population. The amount of encumbrance has been placed at one-third the total value, an estimate arrived at after consultation with a number of real estate experts.

The present estimate is concerned only with homes owned by those having incomes under $2,000, and it is therefore necessary to subtract from the total number those homes owned by persons having more than $2,000 per year. Here we enter the realm of pure conjecture, but it appears likely that the major portion of all homes were owned by persons with incomes under $2,000—say 3 million of the homes owned unencumbered and one and a half million of the homes owned encumbered. The best that can be said of an estimate made by such a method is that the error is a constant one, and that the total is not a large factor in the entire national income.

The question of deciding on an estimate for average rental is almost equally hazardous, but here there is some statistical basis for the estimate made. One method is to ascertain as nearly as we can the proportion of total income that is spent on house rent, and assume that the owner derives this proportion of his income from the use of his home. According to the results of the cost of living survey made by the Bureau of Labor in 1918 to 1919, 13.4 per cent of the total average yearly expenses per family or 12.6 per cent of total average family income, was paid for rent.[1]

Other estimates of the proportion of expenditure for shelter to all expenses for consumption goods are as follows:—

TABLE 23K

PERCENTAGE OF INCOME EXPENDED FOR SHELTER [a]

Authority	Date	Number of families	Place	Percentage
U. S. Bureau of Labor Statistics..	1901	11,156	U. S.	18.12
U. S. Bureau of Labor Statistics..	1917	608	New York	12.91
U. S. Bureau of Labor Statistics..	1917	512	Phila., Pa.	12.04
U. S. Railroad Wage Commission	1915	265	U. S.	20.00
Dallas, Texas Wage Commission..	1917	50	Dallas, Texas	14.51
R. C. Chapin income $1000–$1099	1907	31	New York	18.01
Average, weighted according to number of families.....				17.65

[a] National Industrial Conference Board, *Report No. 9*, p. 4.

[1] *Monthly Labor Review*, August, 1919, p. 118. This investigation covered 12,096 families in 92 industrial centers.

The average, 17.65 per cent, shown in table 23K, is the proportion which the National Industrial Conference Board accepts in its studies of the cost of living. It will be seen, however, that the system of weighting gives great prominence to the investigation of 1901 by the Bureau of Labor Statistics, and that all but one of the later investigations, though more restricted in their scope, show a lower percentage of total income spent for rent.

What probably happened was that the proportion of rent to the total income decreased during the decade—at least until 1918. For the year 1910, therefore, the composite figure of the National Industrial Conference Board is perhaps preferable to the lower ratio of rent found in 1918 to 1919 by the Bureau of Labor Statistics. The average family income in 1910 was about $1200,[1] and 17.65 per cent of this gives $211.80. But a further reduction must be made; not all rent is to be considered as net income to the recipient. About 40 per cent of the rent goes for various expenses of upkeep, repair, taxes, etc., leaving perhaps 60 per cent as net return. This would leave $147.08—or say, $150.00 as the average amount which home owners received as income from their homes in 1910, based on this method of computation.

The average rentals in 91 localities paid by families having an income between $1200 and $1500 per year is reported in the *Monthly Labor Review* as $174 per year.[2] Since these families varied in income and size a further study was made of families of five having an income of $1300, and the average amount of rent was found to be $167 per year.

The average rental paid in 1920 in 92 cities by laboring families is given in the *Monthly Labor Review*.[3] It is stated that "families who live in houses or apartments owned by themselves, and families living in houses or apartments where either heat or light or both are included in the rent, have been omitted." This is therefore a selected sample from which the higher ranges of income are excluded. The average rent of $167.79 may accordingly be considered the low limit, for 1920. This figure should be compared with an indicated rent of $219 for 1920, which is found by applying the average of the index numbers of the National Industrial Conference Board and the Bureau of Labor Statistics (Table 23L) to the basic average rent of $150 in 1910.

If, then, $150 per year is accepted as an average figure in 1910 for the income received from homes by their owners, and this is combined with the conjectured number of homes, the total income in that year was about $600 million. This should be increased by an index number indicating changes in rents, and for this purpose the average of the indices computed

[1] Estimated from total income under $2,000 and number of families.
[2] *Monthly Labor Review*, September, 1919, pages 9 to 30. This survey was made under the direction of Dr. W. F. Ogburn.
[3] *Monthly Labor Review*, September, 1920, pages 84 to 91.

by the National Industrial Conference Board and the Bureau of Labor Statistics is used. The final results show a total income from this source varying from $600 to about $900 million.

TABLE 23L

RENTAL VALUE OF HOMES OWNED BY OCCUPANTS HAVING INCOMES UNDER $2,000

1910 to 1920

Year	I	II	III	IV
	Index numbers of house rents			Estimated rental value of homes owned by occupants [d]
	Bureau of Labor Statistics [a]	National Industrial Conference Board [b]	Average	
	Per cent	Per cent	Per cent	Million dollars
1910				$600 [e]
1911				600 [e]
1912				600 [e]
1913	100	100	100	600
1914	100	100	100	600
1915	101.5	100	100.8	605
1916	102.3	101.5	101.9	611
1917	101	105	103	618
1918	105	115	110	660
1919	114 [c]	128	121	726
1920	134.9 [c]	158	146.5	879

[a] *Monthly Labor Review*, October, 1920, p. 65. These studies are based on 18 cities from 1914 to December, 1917, and thereafter on 31 cities. Prior to 1919, the figures are given for December, and are interpolated for July.

[b] *Report No. 30*, September, 1920. These studies are based on reports from 359 agencies in 158 cities. The figures are for July of each year.

[c] Figures for June.

[d] For estimate—$600 million—see text. This amount is projected by Column III.

[e] Estimated.

§ 23f. Income from Investments

The most obvious method of estimating income from investments is to find what proportion it normally bears to total income. This may be done in several ways and the results compared.

The first method is to prolong the curve made from income-tax data to show the relation between income from investment and income from personal earnings to include the lower ranges. This curve, however, is defective in two ways: (1) It is necessary to class all "business income" as personal earnings, on the ground that it is due to effort and only differs from personal earnings in its contractual nature. (2) This curve tells us what

are the probable personal earnings given any sized income, and not the probable income given any particular earnings. Were the correlation perfect, this form of statement would make no difference; but unfortunately the correlation is unknown, and the original data are not in such shape that they can be turned into a different form.

This curve taken at its face value indicates that personal earnings should be increased as follows, in order to arrive at total incomes of individuals:

TABLE 23M

RELATION BETWEEN PERSONAL EARNINGS AND TOTAL INCOME INDICATED BY INCOME-TAX DATA

1918

Average personal earnings	Average total income
$2,000	$2,215
1,800	1,960
1,600	1,713
1,400	1,480
1,200	1,245
1,000	1,023
800	811
600	603
400	401
200	200

It is clear that this curve cannot be projected more than a short distance, say to $1,500, before it loses all semblance of reality. The most, therefore, that can be said, is that less than 13 per cent (the amount reported by the Bureau of Internal Revenue in its lowest range, $2,000–$3,000) and probably not over 10 per cent of the incomes below $2,000 are due to investments of one kind or another.

Further light is cast on this question by a sample of 12,096 family incomes well scattered in regard to area which were collected by the Bureau of Labor Statistics in 1919. This summary shows the percentage relation of total income to total earnings for the entire range of incomes from "under $900" to "over $2,500," thus considerably overlapping the income tax class. These relations are as shown on page 296.

It will be seen that no definite trend is indicated towards a larger percentage of income from investments with the rise in incomes. Such slight increase, as there is, does not approach the 13 per cent of the $2,000–$3,000 class reported by the *Statistics of Income*. However, it is stated that the effort made in collecting these data was to exclude families which

received any considerable portion of their income from sources other than the husbands' earnings. It is, therefore, to be expected that the proportion of income from investments will normally be higher than that shown in this sample, and that 3½ to 4 per cent may therefore safely be regarded as a minimum figure.

TABLE 23N

PERCENTAGE OF TOTAL INCOME TO TOTAL EARNINGS

(Based on a sample of 12,096 families [a])

Income in dollars	White families	Colored families
Under $900	103.96	103.37
$900–1,200	103.65	103.86
1,200–1,500	103.84	104.93
1,500–1,800	104.15	104.67
1,800–2,100	103.82	108.72
2,100–2,500	105.15	104.98
2,500 and over	103.95	100.49

[a] *Monthly Labor Review*, December, 1919, pp. 40–41.

The total incomes of 1,602 school teachers in five cities were reported as $1,645,460 in 1913.[1] These incomes were analyzed in regard to their sources, and it was found that $1,552,640 came from salaries, and $92,820 from investments. The latter is 5.98 per cent of the former.

In arriving at a decision as to the percentages to be used, the limits were taken as between 4 per cent and 10 per cent. The former is known to be low. The latter rests on questionable assumptions. In view of the fact that the modal income is placed at a figure below $1,000 and that there is probably some relation between income from wages and income from property, it is believed that no great error can be involved in adding 6 per cent to personal earnings in order to arrive at the total income of persons of the group under $2,000.[2]

The results of this computation are shown in the following table:

[1] Report of the Committee on Teachers' Salaries and Cost of Living, 1913.

[2] Bowley, *The Division of the Product of Industry*, page 14, estimates the total "earned" in England below £160 to be £1,046 million and the total "unearned" income below £160 to be £50 million, or about 5 per cent.

TABLE 230

AMOUNT RECEIVED FROM INVESTMENTS BY ALL PERSONS HAVING INCOMES UNDER $2,000

1910 to 1920

(Millions of dollars)

Year	Personal earnings	Estimated income from investments
1910	$13,711	$ 823
1911	14,311	859
1912	14,971	898
1913	15,458	927
1914	15,462	928
1915	15,717	943
1916	18,294	1,098
1917	21,179	1,271
1918	27,777	1,667
1919	29,882	1,793
1920	33,020	1,981

CHAPTER 24

FARMERS' INCOME

§ 24a. Introduction

The information concerning farmers' income is fragmentary, but sufficient in volume to justify the hope of attaining a fairly accurate estimate. Before this estimate is presented certain peculiarities of farmers' incomes and of the data concerning them must be mentioned.

(1) There is no other industry in which non-monetary income makes so large a proportion of the total as in farming. Besides the rental values of the farm homes occupied by owners, we must count in the value of the food and fuel which farmers produce for their own consumption.

(2) Usually the farmer is not only a producer but also a land speculator. Indeed, it is rather upon the increase in the value of his land than upon the sale of his produce that the farmer rests whatever hope he cherishes of growing rich. How large the growth in land values is appears from the Censuses of 1900 and 1910, which report an increase in the value of farm lands of $15 billion in addition to an increase of $5 billion in the value of farm buildings, machinery, and live stock.[1] Fifteen billions for all farms in ten years means an average annual increase in the value of each farm amounting to $323. In the decade covered by our estimates the average increase must have been much larger, because of the great rise in the prices of farm lands which culminated in 1920.[2] When a farmer realizes a profit by selling his land at an enhanced price, that profit constitutes income to him as an individual. But gains of this kind do not constitute income to the nation as a whole, except in so far as the increased farm values arise from such improvements as are made by clearing, fencing, draining, irrigating or fertilizing land. The nation gained no increase of useful goods from marking up the price of its farm lands in 1919–20 and lost no useful goods from marking them down again in 1920–21. Hence we make no effort to estimate the profits and losses which farmers make from fluctuations in land values.

(3) Of course farmers obtain some income from other sources than the

[1] Needless to say, these official figures have a wide margin of error. In particular, figures for land values and the value put upon buildings are unsatisfactory, especially in areas of decreasing farm population. In such districts, the selling values of the farms are often less than the cost of the buildings alone.

[2] These figures have since been reported, and show an increase of land values from $28,475 million to $54,830 million.

cultivation of their own farms. Their share in the income from tax-exempt securities has been included under that heading and must not be counted again here. But another item of importance to farmers must be allowed for—the money they make by doing work for others. How much these earnings amount to can be calculated only in the roughest manner. The few small samples of farmers' incomes which cover this point indicate outside earnings varying between $48 and $117 per year per farmer. On this basis the aggregate outside earnings of all farmers run between one-quarter and three-quarters of a billion annually.

Concerning sources of information, it should be noted that income-tax returns are of little help in estimating farmers' incomes. In 1916 when the exemption limit was $3,000, only 14,407 of the six and a half million farmers filed tax returns. Since that year the tax returns have not been classified by occupations. In 1917, however, there was reported net income of $806,163,957 from "agriculture and animal husbandry," divided among 251,838 returns. In 1918 (the latest date for which detailed statistics have been published), the corresponding figures were $1,122,532,163 and 372,336.[1] The reasons why so small a proportion of the farmers figure in these returns even in a prosperous year are clear. As a class, farmers belong among the small business men with average incomes not much in excess of the average earnings of adult male wage-earners. Further, of these modest incomes a considerable part is in form not subject to taxation—the rental value of their owned homes, the food and fuel they produce for themselves. Finally, small business men with incomes near the exemption limit, especially men who do not keep accurate accounts, probably evade more extensively than any other class the obligation to make tax returns.

The basic data upon which all estimates of farmers' incomes must rest are the Department of Agriculture's annual statements of the gross value of agricultural produce. These figures for 1910–20 are shown in Table 24A. Their chief defect is that they contain a vast amount of duplication. Crops fed to live stock are counted twice, first as the value of the crops themselves, second in the value of the live stock. "Feeders" from the ranges are counted once when sold by the ranchman and again when sold as fat stock. The chief problem is to ascertain the amount of this duplication year by year.

The violent price fluctuations of 1916–20 give rise to special difficulties in piecing together the fragmentary data which come from different years. Of the increase in the gross wealth produced on farms according to Table 24A—an increase from $9 billion in 1910 to $25 billion in 1919—much the

[1] The 1919 *Statistics of Income* has since been published. It shows 418,945 businesses under "Agriculture and related industries," with a total net income of $ 1,211,260,562.

TABLE 24A

THE NUMBER OF FARMS AND THE GROSS WEALTH PRODUCED ANNUALLY

1910 to 1920

Year	Number of farms [a] (Thousands)	Gross wealth produced on farms [b] (Millions of dollars)
1910	6,362	$ 9,037
1911	6,371	8,819
1912	6,380	9,343
1913	6,388	9,850
1914	6,396	9,895
1915	6,405	10,774
1916	6,414	13,406
1917	6,423	19,331
1918	6,432	22,479
1919	6,441	24,961
1920	6,450	19,856

[a] Figures for 1910 and 1920 are from an advance bulletin of the Bureau of the Census, entitled *Number of Farms by States and Counties*, 1920. Other figures are interpolated along a straight line.

A "farm" for census purposes is all the land which is directly farmed by one person managing and conducting agricultural operations, either by his own labor alone or with the assistance of members of his household or hired employees. The term "agricultural operations" is used as a general term referring to the work of growing crops, producing other agricultural products, and raising animals, fowls, and bees. A "farm" as thus defined may consist of a single tract of land or of a number of separate and distinct tracts, and these several tracts may be held under different tenures, as where one tract is owned by the farmer and another tract is hired by him. Further, when a landowner has one or more tenants, renters, croppers, or managers, the land operated by each is considered a "farm." *Abstract of the Census*, 1910, p. 265, footnote 1.

[b] *Statistical Abstract* of the U. S. 1919, p. 183. Duplication of animals and grain fed to animals is included.

greater part represents merely a change in monetary values. The wholesale-price index numbers compiled by the Bureau of Labor Statistics show that the prices of farm products rose from 100 in 1914 to 234 in 1919, or somewhat faster than the general price level, for which the corresponding figures are 100 and 212.[1] But not all of the increase was of this nominal character. The index numbers of the physical volume of agricultural output, recently made by Professors E. E. Day and W. W. Stewart, agree in showing that, with the sharp oscillations characteristic of farming, the volume of goods produced was increasing during the decade.

§ 24b. First Estimate—Based on Total Production and Expenses

Dr. E. A. Goldenweiser [2] has attempted to estimate the proportions by which the "gross value of wealth produced on farms" reported by the

[1] *Monthly Labor Review*, February, 1921, pp. 44, 45.
[2] *American Economic Review*, March, 1916.

TABLE 24B

INDICES OF PHYSICAL PRODUCTION FOR AGRICULTURE

Base, Day, 1909–1913 = 100 [a]
Stewart, 1911–1913 = 100 [b]

Year	Day	Stewart	Year	Day	Stewart
1909.....	95	95	1915.....	113.4	116
1910.....	99.1	98	1916.....	100.4	101
1911.....	94.1	93	1917.....	108.5	110
1912.....	111	111	1918.....	107.1	108
1913.....	98.2	96	1919.....	110.6	112
1914.....	108.5	108	1920.....	115.6	

[a] *Review of Economic Statistics*, Harvard Committee on Economic Research, September, 1920, p. 255.
[b] *Annual Proceedings of the American Economic Association*, December, 1920.

Department of Agriculture should be changed in order to arrive at the net value production of farms. In so doing, he has decreased the total amount reported by the value of food crops fed to animals and has increased it by the value of the produce of the farm which is directly consumed by the farmers' families. In this way, he has arrived at the figure for farmers' incomes in 1909 shown on page 302.

These figures were based on the returns of the Census of 1910, supplemented by the estimates of W. J. Spillman [1] and W. C. Funk.[2] The value of crops for 1909 is reduced by the amount fed to live stock (corn, oats, barley, hay, and forage, kafir corn, emmer, and spelt, totalling $2,786 million) except the amount actually sold ($509 million) and corn consumed by the family ($40 million).

The values of house rent, and of food and fuel consumed are based on Mr. Funk's estimate, which was made up by visiting and going over the monetary affairs of 483 farmers in 10 well scattered localities. In this estimate, Mr. Funk arrived at a total figure of $421 per family,[3] but since the census enumerators are believed to have allowed for a certain portion of pork and beef, vegetables and fruits consumed by the farm family (estimated at $161), he reduced this original total of $421 per family to $260.

The expenditures are mostly based on census returns: $651 million for hired labor, $115 million for fertilizers, $300 million for feed, and $840

[1] Bulletin, July 19, 1913, *The Farmers' Income*, by W. J. Spillman, Agriculturist, Office of Farm Management.
[2] U. S. Department of Agriculture, Farmers' Bulletin No. 635, December, 1914.
[3] The Cornell Bureau of Farm Management found the average value of products furnished by 692 farms in New York State in 1919 to be $449.02. This figure excludes rent, and is thus fairly comparable at relative prices to the amount used in the text. The deduction for duplicate census figuring in the Cornell investigation is about 25 per cent, which leads to the belief that Funk's deduction for duplication is ample.

TABLE 24C

INCOME AND EXPENDITURES OF THE AVERAGE FARMER[a]

1909

Items	Total	Per farm
Income:		
Value of crops[b]	$3,250,359,348	$511
Value of live stock products[c]	1,124,678,632	177
Value of animals sold and animals slaughtered on farms	1,833,151,031	288
Value of house rent and of food and fuel consumed by family and not reported by Census (estimated)	1,653,934,100	260
Gross earnings of farm and farm family	$7,862,123,111	$1,236
Expenditures:[d]		
Labor, fertilizers, feed, seed (estimated), threshing (estimated), animals purchased, taxes (estimated), and miscellaneous	$2,750,344,281	$ 432
Maintenance charges (buildings, equipment, machinery, etc.)	505,979,322	80
Total Expenditures	$3,256,323,603	$512
Net earnings of farm and farm family	$4,605,799,508	$724
Interest at 5 per cent on value of farm property (earnings of farm)	2,049,148,628	322
Earnings of farm family	$2,556,650,880	$402

[a] *The Farmer's Income* by E. A. Goldenweiser, *American Economic Review*, March, 1916, p. 42.
[b] Exclusive of crops fed to live-stock on home farms.
[c] Including dairy products (except milk and cream consumed on the farm) poultry, honey and wax, and wool and mohair.
[d] Exclusive of value of unpaid family labor.

million for animals purchased. In addition, seed and threshing are estimated at $290 million, taxes and maintenance of buildings and implements, and miscellaneous expenses at $1,061 million, making a total of $3,256 million or $512 per farm. No elaborate estimate is made of the interest on mortgages, but a probable amount of $34 per farm is ventured in the text.

If the proportions which Dr. Goldenweiser found be accepted for the moment, and applied to the following years, and due allowance be made for the increase in the total number of farms and changes in prices and costs, then the approximation to incomes of farm families shown in Table 24D can be made.

The total value of crops (Column I) is taken from the annual reports of the Department of Agriculture, and this amount has been reduced to 60

TABLE 24D

ESTIMATED GROSS INCOME, EXPENSES, AND NET INCOME OF ALL FARMERS

1909 to 1920
(Millions of Dollars)

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Total value of crops	60 per cent of value of crops	Value of animal products sold	Value of animals sold and slaughtered	75 per cent of value of animals sold and slaughtered	Value of food, fuel, and house rent	Value of total production (Column II+III +V +VI)	Total cost of production	Approximate interest on mortgage	Approximate amount of rent paid by tenant farmers at 5 per cent of the value of farms	Total expense (Column VIII +IX +X)	Net total value of production (Column VII less XI)
1909.....	$ 5,487	$3,292	$1,177	$1,833	$1,375	$1,654	**$ 7,498**	$3,257	$120	$ 560	**$3,937**	**$ 3,561**
1910.....	5,486	3,292	1,254	2,040	1,530	1,654	**7,730**	3,257	132	569	**3,958**	**3,772**
1911.....	5,562	3,337	1,123	1,903	1,427	1,656	**7,543**	3,302	144	580	**4,026**	**3,517**
1912.....	5,842	3,505	1,257	2,037	1,528	1,659	**7,949**	3,433	156	590	**4,179**	**3,770**
1913.....	6,132	3,679	1,253	2,206	1,655	1,661	**8,248**	3,430	168	621	**4,219**	**4,029**
1914.....	6,111	3,667	1,270	2,252	1,689	1,697	**8,323**	3,483	180	640	**4,303**	**4,020**
1915.....	6,907	4,144	1,287	2,318	1,739	1,733	**8,903**	3,564	192	662	**4,418**	**4,485**
1916.....	9,054	5,432	1,438	2,619	1,964	2,036	**10,870**	4,184	204	724	**5,112**	**5,758**
1917.....	13,479	8,087	1,909	3,551	2,663	3,126	**15,785**	5,973	216	785	**6,974**	**8,811**
1918.....	14,330	8,598	3,136	4,370	3,278	3,566	**18,578**	7,062	228	881	**8,171**	**10,407**
1919.....	14,081	8,449	3,591	4,622	3,467	3,790	**19,297**	7,573	240	987	**8,800**	**10,497**
1920.....	9,165	5,499	3,952	3,950	2,963	4,172	**16,586**	8,321	252	1,082	**9,655**	**6,931**

per cent of its reported value (Column II), in order to eliminate that part of the crop which was fed to live stock, and which, therefore, appears under the heading "Value of Animals" (Column IV).

The value of animal products (Column III) is reported in the Census of 1909, and certain items included have been reported in the Census of 1914 and the advance sheets of 1919. For the intercensal years, the amounts have been supplied by the Department of Agriculture.[1] These amounts, however, do not check closely in detail with the Census figures. For example, the Department figure for dairy products in 1919 showed an increase of 360 per cent over 1909, while the Census figures indicated an increase of only about 300 per cent. The Department of Agriculture's figure for poultry and eggs shows an increase in 1919 over 1909 of 267 per cent, whereas the advance sheets of the Census indicate an increase of only about 200 or 210 per cent. Assuming that the Census figures are more accurate than the estimates of the Department of Agriculture, which are admittedly rough, it has been concluded from these indications that the Department's figures are from 12 to 22 per cent too high. They have accordingly been reduced by 17 per cent.

The amount of correction to be applied for the value of animals is dubious (Column IV). Some duplication exists in the valuation of animals, owing to re-sales of live stock. This has been placed rather arbitrarily at one-fourth the reported value of animals, an amount which is indicated by unpublished samples available in the Bureau of Farm Economics. Data on this head were collected for the Census of 1910, but some doubt was thrown on their accuracy, and they have not been published.

The value of food, fuel, and house rent (Column VI) is based on the original amount of $260 per farm taken from Dr. Goldenweiser, and multiplied by an index number.[2] This series is made up of the Bureau of Labor Statistics index number of wholesale prices of farm products and fuel,[3] weighted in the proportion of 7 to 1.[4] The index number is further adjusted to take into account the increase in the number of farms.

The total cost of production (Column VIII) is taken from Dr. Goldenweiser's estimate for 1910 and extended over later years by an index number constructed as follows: The figures for 1911, 1912, and 1913 are multiplied by the Bureau of Labor Statistics' index number for wholesale prices, and by the variations in acreage. For 1914 to 1918, the index numbers compiled by the War Industries Board in its *History of Prices during the War* were used for the separate items of expense, i. e., feed and forage, live stock, meats and fats, and fertilizers. These series ceased with 1918,

[1] Office Table No. 423, Department of Agriculture.
[2] No comparative data for rents of farm dwellings are available.
[3] *Monthly Labor Review*, June, 1920, p. 69.
[4] W. C. Funk, Farmers' Bulletin No. 635, p. 5.

and the 1919 and 1920 amounts are arrived at by applying the relative change in wholesale prices of the Bureau of Labor Statistics. An index number for farm labor was computed from the quotations of the Department of Agriculture; Miscellaneous and Maintenance, Expenses, Seed and Threshing were multiplied by the Bureau of Labor Statistics index number of wholesale prices, together with the variations in acreage.

The total amount of farm mortgages (Column IX) in 1910 was reported at $1,726,172,851,[1] and as this is known to be but a partial return, an approximation of $2 billion has been ventured. Interest is estimated at 6 per cent. For 1919, the total of farm mortgages is estimated at $3,598,985,000, by James B. Morman,[2] and $4 billion is used as a round sum. The amounts for the intervening years are interpolated.

The amount of rent paid by tenant farmers (Column X) is found by the following method: $40.9 billion is taken as the value of all farm property in 1910.[3] Early returns of the Fourteenth Census indicate that the corresponding amount is about $77.9 billion in 1920. The amounts for intercensal years have then been interpolated. The proportion of farm land worked by tenants in 1910 was 27½ per cent, having a total value of about $11 billion,[4] and this proportion was continued throughout. Finally, the income of this land which goes to persons outside of agriculture was estimated on a basis of 5 per cent of the reported value of the lands worked by tenants as given in the Census.

§ 24c. Second Method—Based on Average Ratio of Expenses to Total Product

An unpublished study made by Professor G. P. Scoville, of Cornell University, covering 2,784 farms in eight counties in New York State, for the years 1908 to 1918, indicates that (a) the value of total crops raised on farms at the prices for which crops were sold, is roughly equal to (b) the total income from the sale of crops and live stock, including gains and losses in live stock inventory, and to (c) the total gross income, including gain or loss in farm capital and miscellaneous returns. The exact averages for these three items are respectively $1,744, $1,776, and $1,889, giving a grand average of $1,803. The average cash expenses per farm,[5] about $930,[6] were somewhat over one-half of the average amount of $1,803,

[1] Census 1910, Vol. 5, p. 162, Table 6.
[2] *The Place of Agriculture in Reconstruction*, p. 319.
[3] *Abstract of the Census*, 1910, p. 281.
[4] *Abstract of the Census*, 1910, p. 285, shows 226,000,000 acres worked by tenants as against 598,000,000 acres by owners.
[5] Does not include unpaid family labor.
[6] This relationship of expenses to gross sales is corroborated by the *Statistics of Income*, 1917, p. 16. These data refer to business incomes, from agriculture and animals, which "represent only such amounts reported by individuals as were derived from business operations and do not necessarily indicate the principal occupations of, or the total incomes reported by, the persons making the returns." The number of returns is 251,838, the gross

or 51½ per cent. If a generalization of farmers' incomes be attempted on this basis, then the net income is in each case slightly less than one-half of the Department of Agriculture's figures for gross value of agricultural production. The data collected are too scattered to permit of any generalization in regard to variations of costs during any particular year of this period.

That this relation of expenses to gross wealth produced is somewhat too low for the country at large is indicated by other samples. A study of 500 farms in Sumter County, Georgia, [1] indicates that the proportion of farm expenses to farm receipts on a cash basis ranges from 55 to 65 per cent. In the Indiana area, the expenses constitute from 40 to 50 per cent of the farm receipts not including the farmer's own labor.[1] A pamphlet entitled *Farm Business in New Hampshire*,[2] shows average earnings for 303 farms in all parts of the State to be $3,290, and the average expenses to be $1,968, or 59 per cent. This, however, is not strictly comparable with Professor Scoville's estimate, since it does not include grain fed to animals among the expenses.

A fair result will presumably be reached by deducting 55 per cent of the gross value produced for expenses.

That the rise in costs has been somewhat less in proportion than the rise in the value of product is indicated by the following table. The first column is a statement of relative costs from data covering 185 farms in Wisconsin, Ohio, and Indiana collected by the United States Office of Farm Management. The second column is a similar statement of relative costs from data for two counties in Illinois, as ascertained by the Department of Farm Organization and Management of the University of Illinois. The third column is the index number of the United States Bureau of Labor Statistics for prices of farm products in cities. Since the price in cities is not the vital consideration with the farmer, an unweighted index number of 31 farm products on the farm is also shown in Column IV.

We may therefore conclude that the results found by taking farm expenses at 55 per cent of the Department of Agriculture's estimate of wealth produced on farms will not tend to be relatively high for the latter half of the decade in comparison to the first half. This, however, will not hold true in all sections of the country, for prices of different classes of product increased in different ratios. Conditions in different parts of the country vary so greatly that every generalization must be taken with a grain of salt.

sales are $1,622,907,759, the business expenses are $816,743,802, and the net income is $806,163,957. The two are thus approximately equal, bearing out the relationship in so far as the "total income from the sale of crops and live stock" is concerned.

[1] Unpublished data of the Bureau of Farm Economics.

[2] By A. B. Genung, *Farm Management Demonstrator*, 1920.

TABLE 24E

RELATIVE INCREASE OF FARM EXPENSES AND PRICES OF FARM PRODUCTS

Year	I Relative cost of farming in Wisconsin, Ohio and Indiana [a]	II Relative cost of farming in two counties in Illinois [b]	III Index number of market prices of farm products [c]	IV Index number of prices of farm products on farm [d]
1913	100	100	100	100
1914	108	90	103	105
1915	111	95	105	107
1916	118	100	122	128
1917	148	120	189	195
1918	193	136	220	210
1919		142	234	213
1920			218	216

[a] Unpublished data of the U. S. Bureau of Farm Management.

[b] Figures furnished by University of Illinois, Department of Farm Organization and Management. The comparability of these cost figures with those collected by the U. S. Department of Agriculture has been questioned.

[c] *Monthly Labor Review*, February, 1921, p. 45, U. S. Bureau of Labor Statistics index number.

[d] These data were supplied by Professor G. F. Warren, and converted into index numbers.

Application of the method suggested yields the following results for each year:

TABLE 24F

ESTIMATE OF FARMERS' INCOMES

(Based on 45 per cent of the total value of farm production reported by the Department of Agriculture)

(Millions of Dollars)

Year	Total value of farm production [a]	45 per cent of gross total value
1910	$ 9,037	$ 4,067
1911	8,819	3,969
1912	9,343	4,204
1913	9,850	4,432
1914	9,895	4,453
1915	10,774	4,849
1916	13,406	6,033
1917	19,331	8,699
1918	22,479	10,116
1919	24,961	11,232
1920	19,856	8,935

[a] *Statistical Abstract of U. S.*, 1919, p. 183.

§ 24d. Third Estimate—Based on Sample Incomes

A third method of attack is suggested by unpublished data collected by the Bureau of Farm Economics, covering the distribution of labor income among 11,000 farms in widely scattered parts of the country. In this study, the years 1910 to 1915 were considered to represent substantially uniform conditions, and so were the years 1916 to 1918. Samples from different years in the first period were averaged together, and so also were samples from different years in the second period. What are shown, therefore, are rough averages covering these respective periods. For each period, the percentages of all farms studied are grouped under the following income ranges:

TABLE 24G

LABOR INCOME OF FARMERS [a]

1910 to 1915

Annual labor income in dollars	Per cent of total farmers receiving income named	Total number in each income range (based on 6,400,000 farmers)	Total labor income (Millions of dollars)
$0–$500	36.5	2,336,000	$ 584
500–1,000	17.7	1,132,800	850
1,000–1,500	7.4	473,600	592
1,500–2,000	3.4	217,600	381
2,000–2,500	1.5	96,000	216
2,500–3,000	1.0	64,000	176
3,000–4,000	1.0	64,000	224
4,000–5,000	.3	19,200	86
5,000–10,000	.4	25,600	192
Over $10,000	.0		
			$3,301
Negative Income			Less
0–500	23.9	1,529,600	382
500–1,000	4.7	300,800	226
1,000–1,500	1.2	76,800	96
1,500 and over	1.0	64,000	96
	100.0	6,400,000	$800
Net Labor Income of All Farmers			$2,501

[a] This table is based on an unpublished distribution of 11,000 farmers' incomes made by the U. S. Bureau of Farm Economics. "Labor Income" is defined as the amount of income remaining after deducting all expenses including a 5 per cent return on the estimated invested capital.

TABLE 24H

LABOR INCOME OF FARMERS [a]

1916 to 1918

Annual labor income in dollars	Per cent of total farmers receiving income named	Total number in each income range (based on 6,500,000 farmers)	Total labor income (Millions of dollars)
$0–$500	28.6	1,859,000	$ 465
500–1,000	19.9	1,293,500	970
1,000–1,500	10.9	708,500	886
1,500–2,000	6.1	396,500	694
2,000–2,500	4.6	299,000	673
2,500–3,000	2.6	169,000	465
3,000–4,000	3.1	201,500	705
4,000–5,000	1.3	84,500	380
5,000–10,000	1.8	117,000	877
Over 10,000	.8	52,000	520
			$6,635
Negative Income			Less
0–500	13.9	903,500	226
500–1,000	4.1	266,500	200
1,000–1,500	1.0	65,000	81
1,500 and over	1.3	84,500	127
	100.0	6,500,000	$ 634
Net Labor Income of All Farmers			$6,001

[a] See Note a, Table 24G.

When the percentages shown in each income group are applied to all the farmers in the country, the results show an average total income for the years 1910 to 1915 of $2½ billion and for the years 1916 to 1918 of $6 billion.

The rental value of land owned by farmers, which is deducted by the Bureau of Farm Management before arriving at its figure for labor income, may be estimated from the following facts: In 1910, the total value of farms was $40 billion and of this operators owned 72½ per cent, or about $29 billion.[1] Five per cent of this amount is $1,450 million, which after deducting $200 million for interest on mortgages, leaves $1,250 million, which may be added as a rough total to the 1910 to 1915 estimate. The

[1] It seems to be generally true that the most valuable farms in the North are worked by tenants. This, however, is not true of farms worked by negro tenants in the South. The percentage value of farms will not, therefore, coincide exactly with the percentage of acreage, though the amount of error is uncertain on account of the variation of conditions in different parts of the country.

1916 to 1918 figure would be somewhat larger; perhaps $2 billion would not be out of the way. The estimate of the value of farm property for 1920 has not yet been published.[1]

The total average annual farm production thus arrived at is therefore as follows:

Period	Average annual labor income	Average annual income from property	Total income of farmers
	(Billions of dollars)		
1910 to 1915	$2½	$1¼	$3¾
1916 to 1918	6	2	8

§ 24e. Final Estimate of Farmers' Incomes

When the three estimates are placed alongside of each other, they are seen to be fairly comparable in general trend. In order to compare the results of the first and second methods with those of the third method, the averages of the corresponding years have been computed. These averages have been weighted in accordance with the number of cases taken from each year in arriving at the results shown by the third method. The figures obtained by the three methods are thus made strictly comparable. It will be seen that this comparison confirms the general results found by the first and second methods. All three methods show a marked rise in monetary incomes between the periods 1910 to 1915 and 1916 to 1918.

The final estimate of farmers' incomes, as shown in Table, 24J, is based on a combination of the results arrived at by the three methods. Where there is a considerable discrepancy, the figures found by the first method are given greater weight. In addition, from $200 to $300 million has been included to take care of the "outside income" which many farmers earn. The results are given in terms of billions of dollars, for they cannot claim to be more than a careful approximation.

§ 24f. Comparison with Other Estimates

Mr. W. R. Ingalls,[2] arrives at $5,200 millions for farmers' incomes in 1916, but he has deducted $2,800 millions for farm laborers, a figure much larger than that used here. If the estimate for farm labor be added to the amount found as income of farmers in 1916, our result is about $7,300 millions as against Mr. Ingalls' $8 billions. It is believed his estimate of expenses other than cost of labor paid is somewhat too low. Mr. W. I.

[1] It has since been placed at $77.9 billion in an advance bulletin of the Census of 1920.

[2] *Labor, the Holder of the Nation's Wealth and Income*, New York Times Annalist, September 13, 20, and 27, 1920.

TABLE 24I

COMPARISON OF TOTAL FARMERS' INCOMES AS FOUND BY THE THREE METHODS EMPLOYED

1910 to 1920

(Billions of Dollars)

	I		II		III
Year	First method [a]	Weighted average	Second method [b]	Weighted average	Third method [c]
1910	$ 3.772		4.067		
1911	3.517		3.969		
1912	3.770	3.93	4.204	4.33	3.75
1913	4.029		4.432		
1914	4.020		4.453		
1915	4.485		4.849		
1916	5.758		6.033		
1917	8.811	7.69	8.699	7.72	8.00
1918	10.407		10.116		
1919	10.497		11.232		
1920	6.931		8.935		

[a] See Table 24D. Based on an estimate of gross income and expenses of farmers.
[b] See Table 24F. Based on deduction of expenses (55 per cent of total produce) from the Department of Agriculture's estimate of gross wealth produced on farms.
[c] See Tables 24G and 24H and text, p. 310. Based on 11,000 samples of the labor income of farmers plus property income.

TABLE 24J

FINAL ESTIMATE OF THE TOTAL INCOME OF FARMERS

1910 to 1920

(Billions of Dollars)

1910	$3.95
1911	3.70
1912	4.00
1913	4.20
1914	4.20
1915	4.70
1916	5.80
1917	8.80
1918	10.45
1919	10.85
1920	7.20

King's estimate for 1910 given in the *Wealth and Income of the People of United States* [1] was $6,842 millions, and this included the income of farm laborers. Even when a deduction is made for the latter item, the estimate appears too high, and Mr. King's recent investigations, aided by more complete evidence, lead him to believe that the amount should be reduced. Mr. H. A. Wallace [2] has made a similar computation, based on the "ratio" method. This computation is based on the assumptions that crops are sold as crops, and not as live stock, and that live stock is taken into consideration solely as the form in which pasture is marketed. These assumptions make his results somewhat too low. But his relative increase in 1917, 1918, and 1919 is somewhat greater than ours, though the general trend of his figures is the same. He generously states in a letter: "I have dug into this matter sufficiently so that I think in the main your figures are accurate." The annual farmers' income, according to his figures, is as follows:

(Millions of Dollars)					
1909	$3,570	1913	$3,585	1917	$9,210
1910	3,070	1914	3,600	1918	8,900
1911	3,140	1915	4,000	1919	9 400
1912	3,440	1916	5,700	1920	3,900

§ 24g. Farmers Having Incomes Over and Under $2,000

Finally, how many farmers had incomes over and under $2,000, and what did their total incomes in each of these classes amount to? These figures must be found, in order that they may be carried back to complete the estimates of Chapters 22 and 23.

The only basis for drawing the $2,000 line through our totals is a sample for 1918 of 401 farmers' incomes furnished by Professor G. P. Scoville of the New York State College of Agriculture. While this is a small sample, it is the only one that was found which gives actual income. The assumption implicit is not that these farmers' incomes are typical of the entire country, but that the *distribution* of income among them is typical. The average income of these 401 farmers in 1918 was $1,481, whereas the average income of all farmers in the same year was $1,625. This fact, however, does not invalidate the hypothesis that the distribution shown by the sample was typical. Such comparisons as it has been possible to make with the larger number of 11,000 *labor* incomes, shown in Tables 24G and 24H, after making an allowance for farm income, tend to justify the use of this distribution. On this assumption, the probable division of number

[1] Page 138.
[2] *Agricultural Prices*, pp. 57-61.

of farmers and amount of farmers' incomes by the $2,000 line for each year is as follows:

TABLE 24K

NUMBER OF FARMERS HAVING INCOMES OVER AND UNDER $2,000, AND THE TOTAL AMOUNT OF THESE INCOMES

Year	I	II	III	IV	V	VI
	Total		Over $2,000		Under $2,000	
	Number of farmers (Thousands)	Total income (Billions)	Number of farmers (Thousands)	Amount of income (Billions)	Number of farmers (Thousands)	Amount of income (Billions)
1910	6,362	$ 3.95	111	$ .258	6,251	$3.692
1911	6,371	3.70	79	.182	6,292	3.518
1912	6,380	4.00	111	.262	6,269	3.738
1913	6,388	4.20	143	.340	6,245	3.860
1914	6,396	4.20	144	.340	6,252	3.860
1915	6,405	4.70	208	.516	6,197	4.184
1916	6,414	5.80	448	1.179	5,966	4.621
1917	6,423	8.80	1,313	3.886	5,110	4.914
1918	6,432	10.45	1,861	5.784	4,571	4.666
1919	6,441	10.85	2,008	6.298	4,433	4.552
1920	6,450	7.20	804	2.261	5,646	4.939

CHAPTER 25

CORPORATE SURPLUS

§ 25a. Definition of Corporate Surplus

Corporations do not generally pay out their entire earnings to their stockholders. Even after reserves for losses, depreciation, insurance, etc., have been made, it is still true that earnings ought to be in general greater than dividends. The excess of earnings over dividends after specific reserves have been set aside constitutes corporation surplus. Such retained earnings are generally put back into the business, though they may be invested otherwise.[1]

§ 25b. The Propriety of Counting Surplus as Part of the National Income

Should these corporation surpluses be included as part of the National Income? It must be remembered that these surpluses are computed after the deduction of reserves for depreciation, taxes, bad debts, insurance and a variety of ascertained losses. To the corporations they are therefore a book income, and normally are used to ensure regularity in payment of dividends and for an expansion of their business.

In the accounting practice of corporations, surplus may be used for scaling down the value of intangible assets, for conversion into stock which is distributed in the form of dividends, or it may simply be continued as a surplus account.[2] Indeed, it might be possible to distribute the entire earnings of a corporation and finance expansion by means of new stock issues. But the trend of American business policy is towards the maintenance of dividends in years of low profits as well as high.[3] This attempt at maintenance of dividends demands a conservative policy in years of high profits and a daring distribution of cash in the lean years. Such a policy can be maintained, therefore, only when there is in good years a

[1] The distinction between dividends and surplus is not necessary in treating private business and partnerships, for in the income-tax returns used here the entire earnings are included in the incomes of the individuals owning the business.

[2] The Income Tax decision in McCombe *v.* Eisner (252 U. S. 189), involved the question whether a stock dividend should be considered income. The basic assumption was that a corporation was an entity, and therefore the definition of income hinged on the legal separation of its assets and their ownership by individuals. From an economic point of view, income must be considered as far as possible to accrue at the time of its receipt by the party earning it—either corporation or individual. Owing to the form in which most of the data are presented, income is regarded as accruing only when it is received by the individual, but the fact that so much of our business enterprise is in corporate form makes it necessary to recognize corporate surplus as a separate item.

[3] English practice tends towards a larger and more varying distribution of corporate earnings in the form of dividends.

considerable margin between earnings and dividends. In many cases dividends in lean years are paid wholly or partly out of surplus, which is the first shock-absorber (after reserves) of business adversity. The fact that dividends and other losses are taken out of surplus in years of depression means that this surplus was actually earned in years of prosperity. An accurate accounting of the National Income year by year should bring out these real variations in corporate earnings. To take no cognizance of their rise and fall would create a false impression of the uniformity of income over years of depression and years of expansion.

During the years 1920 and 1921, we have seen in many corporations not only a lack of surplus but even a deficit which wiped out a part, or more than all, of the surplus accumulated in previous years. This development, however, does not mean that the surplus had not been real income in the years in which it was gathered. On the contrary, the later loss confirms the reality of the surplus accumulated in preceding years. Clearly an accurate statement of the National Income year by year should take into consideration both the surpluses of prosperous years and the deficits of periods of depression. It might well happen that the accounting of "corporate surplus" in any year might yield a net "corporate deficit."

§ 25c. The Genuineness of Reported Surplus Accounts

In some form, then, corporate surplus constitutes an element in the National Income. Whether it should be considered on an equal footing with the income actually distributed as dividends to individuals, or whether it should be shown as contingent income, is another question. If it were the general practice of corporations to carry adequate [1] reserves and if the entire net income were normally distributed as dividends, then there could be no question that the entire net incomes of corporations (including what is now generally carried as surplus) should be counted on the same basis as all other income. If, however, the general reserves of corporations are normally insufficient, and if surpluses are wholly or mainly absorbed in meeting unforeseen business losses, then they too should be treated as reserve, or at least contingent income, subject to later disposal. They could not be treated as actual income until the business situation had so developed as to make possible an approximation of the extent of these losses.[2]

This brings up the question whether the surplus accounts of corporations represent a true increase of assets or merely a reserve account against

[1] It is assumed that reserves are rarely too large to meet current losses. Any excess of reserves above current losses manifestly makes the surplus as reported too small by a like amount.

[2] Broadly, the reserves of corporations are at least as adequate as those of individuals and partnerships engaged in business. Incidentally, I do not think sufficient weight has been given to the net losses, or negative income of the latter. J. E. Sterrett.

unexpected losses.[1] Individual examples of both kinds are common, and extraordinary changes in the price level further complicate the problem of bookkeeping values. If it could be shown that physical production did or did not normally increase with the increase of invested capital through the growth of the surplus account, the problem whether the surplus account represented an increase of assets or a reserve which is normally wiped out by losses could be answered. But the measurement of physical production presents the difficulty that very few business enterprises turn out a single standardized article over a series of years. One must therefore turn to the money value of the product, remembering however (a) that changes in money value do not represent changes in physical production during a period of price change, and (b) that money value is apt to misrepresent physical product if new assets are put into labor-saving devices. In the latter case it often happens that while the total product is not increased, the labor cost is decreased and the profit increased.

If surplus is correctly reported, an increase in surplus should lead to a corresponding increase in physical production after these two factors have been allowed for. However, the increase in physical production should not be in proportion to the increase in surplus but in proportion to the increase in capital plus surplus. In other words, if surplus be *bona fide*, its effects upon production, when it is put into the business, should be similar to the effects of new capital.

The question then is, whether physical productivity tends to vary directly as the capital plus surplus shown on the books. An attempt has been made to answer this question. The corporations whose capital plus surplus and physical productivity were examined included all for which comparable statistics were obtainable during the whole period chosen for investigation. The years 1905 to 1914 were chosen for several reasons, one of the most important of which was that no violent price movements occurred.

The method used was to break the decade into two five-year periods, 1905 to 1909 and 1910 to 1914, and then compare changes in capital plus surplus from the average of the first five-year period to the average of the second five-year period, with corresponding changes in physical production from the first period to the second.

[1] It is suggested that the real question is not whether surpluses are used as reserves or to expand the business or for some other purpose, but whether the inventories at the different dates correspond to actual market values or are merely fictitious figures. There is no known way of testing this correspondence other than to take a broad view of the actual results of business operations over a period of years. To attain such a view is the aim of the following discussion.

With the conclusions drawn here compare the evidence adduced by Dr. David Friday (*Profits, Wages, and Prices*, p. 63) from a group of 4,508 corporations which were listed in *Corporate Earnings and Government Revenues*, Senate Document No. 259, 65th Congress, 2nd Session. His compilations show that their invested capital was 182 per cent of their capital stock.

Physical productivity not being directly measureable, money indices were used. The disturbing effect of price movements would seem to be small in this period. Average prices of 1910 to 1914 were about 9 per cent above the average of 1905 to 1909.[1]

The money indices of physical production used were net earnings, gross earnings, net profits, total sales.

The corporations and the two variables examined in each case are as follows:—[2]

1. Twenty-five public utilities, (a) capital plus surplus and (b) net earnings.
2. Twenty-six public utilities, (a) capital plus surplus and (b) gross earnings.
3. Twenty-four industrial companies, (a) capital plus surplus and (b) net profits.
4. Fifteen industrial companies, (a) capital plus surplus and (b) total sales.
5. Thirty-nine industrial companies, (a) capital plus surplus and (b) net profits.

In each case a straight line was fitted to the widely-scattered points representing the two variables in the case of each company by the method of least squares, and the results are shown in the following diagram. If the volume of business had increased in exactly the same ratio as capital plus surplus, then on these diagrams the straight lines fitted to the points would all have an inclination of 45 degrees. To show how nearly the plotted lines correspond to this condition, a dotted 45 degree line has been inserted in the diagrams.

Though no single example can be considered conclusive, the grouping of all the lines around the 45 degree line indicates a close relation between the growth of assets through reinvested surplus and the growth of production.

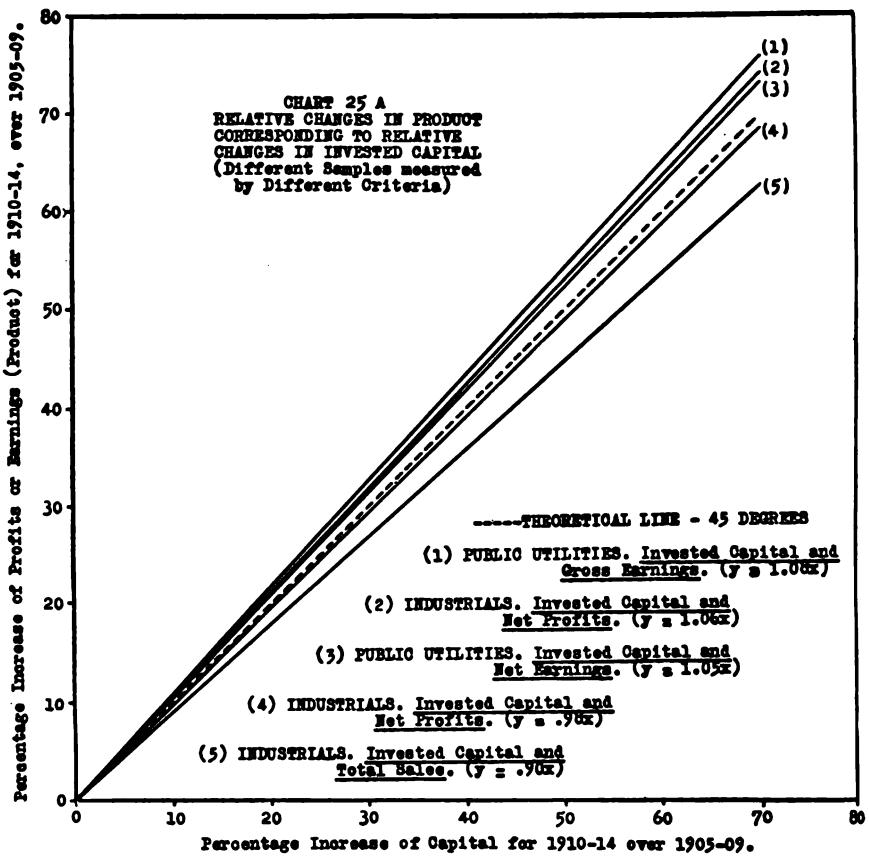
A further test is suggested by the Census figures for primary horsepower and capital used in manufacturing. The data are for the years 1904 and 1914.[3] Both figures, especially the amounts for capital, are faulty, and too great reliance should not be placed on them. Yet they suggest a close relation between the growth of capital (including surplus) and the growth of productive power. Moreover, the index of productive power is in this case not monetary.[4]

[1] Bulletin of U. S. Bureau of Labor Statistics, No. 181, p. 16.

[2] These samples were taken from the reports in *Moody's Manual* and supplemented by the corporate records furnished by two large banks. There is some overlapping of samples, especially between items 1 and 2, and 3 and 4.

[3] The 1919 figures are not yet available, and when they do become available will be affected by price flucutations in such degree as to make them of little value for the present purpose.

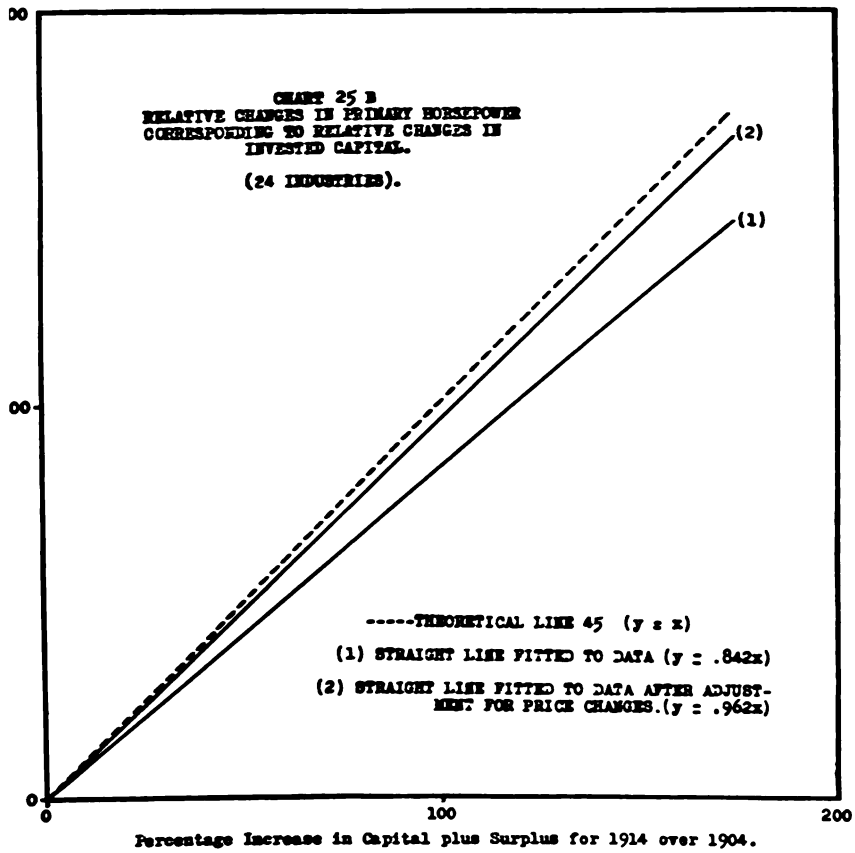
[4] The question is raised whether horsepower can be taken as a constant factor for purposes of this computation during the period covered. If the value product per horsepower remained constant, then it is a good criterion.



The figures for 1904 were reduced to a basis of 100, and the relative increases or decreases for 1914 have been plotted. These relations represent data from 24 industries (including 19,279 establishments) and seem typical of the whole. The equation of the least square straight line through the origin is $y = .842\ x$. Here capital values are growing at a slightly higher rate than the productive powers which they represent. If the relation were such that horsepower varied directly as capital plus surplus, the equation would become $y = x$.

The straight line fitted to the data of the accompanying chart comes much closer to the theoretical line $y = x$, if an adjustment is made in capital plus surplus to offset the rise in prices from 1904 to 1914.[1] Though such adjustment for the complete change in prices undoubtedly is too great, owing to the fact that the rise in investment prices was not as rapid as that

[1] Bulletin No. 226, U. S. Bureau of Labor Statistics, p. 28.



the index used—namely, wholesale prices. there is no doubt that ne adjustment is needed. The true relation lies between the two es.

While these results may be tentatively accepted for the pre-war iod, the further question is raised as to their validity since 1914. e we to include the large surplus accounts of recent years in the tional Income?

Several considerations must be taken into account:

(1) The rise in prices which brought about a lessened physical product · dollar for the invested surpluses of these later years.

(2) The increased replacement value of fixed capital assets and inventies.

(3) The increased demand for certain products during the war, which nand fell off after its close.

(4) The increased income and excess profits taxes.

These considerations affect our attitude toward the bookkeeping methods employed. The actual amounts of expenses, reserves, surplus, and dividends shown in the books are subject to wide variation according to the judgment of accountants and business men. It follows from the preceding argument that prior to 1914, the reserves set up against specific uncertainties were normally sufficient to cover the greater part of the unforeseen losses which occurred in business, since in a broad sense the surplus financed a roughly proportionate increase in the volume of new business transacted.

Did American business men, operating under the stress of all the forces of uncertainty after 1914, abandon their conservative policy of deducting reserves adequate to cover current losses and carry as surplus that which should really be considered a reserve account? The answer to this question cannot be found by mathematical treatment. The items are too complex and interwoven to permit of separation. There were, during 1920, many striking cases of writing off of surplus accounts owing to the unforeseen large depreciation in values; but as already said, that fact does not invalidate the genuineness of the surpluses during the years when they were accumulated. On the other hand, there have been a large number of instances of stock dividends, which converted the surplus account into a capital account. These conversions suggest that the two accounts are generically similar and capable of being interchanged.

When the enormous deterrent to the writing up of profits interposed by high taxes is considered, the burden of proof seems to lie upon those who would consider the reported surplus as fictitious at the time it is earned. That there have been certain unfortunate investments is clear, but the strength which has been shown by many corporations during the recent depression bears testimony to the general adequacy of reserve accounts. Moreover, capital values were not generally written up during the war owing to the higher replacement costs. In old enterprises inflated costs only affected new investments and inventories. The losses which were taken in 1921 by many corporations were commonly taken care of in the balance sheet by reducing surplus. This situation should be shown in the figures, when they are available, for that year.

Opinions regarding the adequacy of reserves are affected in large measure by personal environment. The experiences of individuals with those concerns about which they have special information influence their judgment in making wider generalizations, and individual experiences vary. After consultations with a number of men, whose positions are such as to give them a broad view of business policies the conclusion has been reached that between 80 and 90 pe

surplus constitutes a genuine saving, and hence is a part of the National Income.[1,2]

§ 25d. The Data

The Bureau of Internal Revenue reports the total net earnings of corporations in the volumes entitled *Statistics of Income* for the years 1916, 1917, and 1918. For the years 1909 to 1913 total earnings are given in the annual reports of the Commissioner of Internal Revenue. For the years 1914 and 1915 they are not given but may be estimated from the amount of the tax.

These data, however, are not comparable without adjustments. During the period 1909 to 1912, corporations paid taxes only on their actual earnings, not including such sums as they received from stock ownership in other corporations. This practice was changed in the period 1913 to 1917, when the tax was collected on all the net income of a corporation from whatever source it might come. In 1918 there was a reversion to the earlier practice.

This change in practice, however, has made little apparent difference in the results. The percentage changes from year to year in the earnings of all corporations have been compared with the percentage changes of the earnings of the 205 sample corporations quoted elsewhere[3] and with the 251 corporations for which data were collected by Professor Friday.[4] In both these samples, earnings are estimated from year to year on a strictly comparable basis. There is found to be no constant divergence from the earnings of all corporations on which to base a correction for the change in method of computing taxes. In 1913, compared with 1912 the net earnings of all corporations reported by the Bureau of Internal Revenue increased 13 per cent, the net earnings of the sample of 205 corporations increased 9 per cent, and the sample of 251 corporations increased 6 per cent. In 1914 the decreases from 1912 in the three sets of data were respectively 23 per cent, 18 per cent, and 19 per cent. In 1915

[1] In my paper in the *Annalist* (September 20, 1920), I expressed [illegible] that corporate surplus is wholly income and urged that [illegible] division of income is simply what is actually paid [illegible]

Without any doubt corporate surplus is in part [illegible] it disappears, as experience has shown, [illegible] ginning of the war a large part of the corporate [illegible] as a war measure, which plant must [illegible] deluded ourselves with the idea that [illegible] were going to enable them to maintain [illegible] that illusion is being dispelled. W. R. Ingalls.

[2] This is doubtless true of ordinary times. [illegible] throughout was to under rather than to [illegible] tax laws did not allow reserves for future [illegible] anticipate a drop in price levels [illegible] commodities crash down below the [illegible]

[3] A, note d.

[4] [illegible] Wages and [illegible]

the increases over 1912 were respectively 28 per cent, 52 per cent, and 36 per cent. In 1916 the new influence on bookkeeping methods exerted by the increase of the corporate tax rate to 2 per cent renders close comparisons with earlier years hazardous. As between the 1917 and 1918 data, when the method of computing corporate earnings was changed again, the Internal Revenue figures for earnings fell about 22 per cent, as against a fall in the two samples of 24 per cent and 10 per cent.

These comparisons lead one to believe that the inclusion or exclusion of intercorporate dividends was not a factor of major importance in net earnings. Other forces outweighed it to such an extent that its effect cannot be ascertained from the available data.

Further, during the period 1909 to 1912, corporations having an income of less than $5,000 per year were exempted from the tax. The removal of this exemption in 1913 caused an increase in number of corporations paying taxes, of about 125,000. From this increase the probable earnings of such corporations in the earlier years may be roughly approximated.

Another complication is that each year back taxes have been collected after a field inspection of the books of selected corporations. The assessment of these taxes indicates a considerable degree of under-reporting of income, even in the years prior to 1916, when the tax rate was only 1 per cent. Back taxes as high as $3 to $4 million were assessed for each year, indicating an income of as many hundreds of millions or about 10 per cent of the reported total. Even these field inspections are reported to have been far from complete, owing to an inadequate staff.

The final amounts of corporate income estimated for each year are shown in Column I of Table 25A.[1] An independent check of the amounts reported in back taxes in the annual reports of the Commissioner of Internal Revenue[2] approximately verified these totals.

A classification of corporate earnings into financial, commercial, manufacturing, mining, public utility and railroad earnings has been given at various times in the annual reports of the Commissioner of Internal Revenue and in the *Statistics of Income*, and an effort has been made to complete these classifications. But so many discrepancies have been found in the amounts reported that a presentation of this material as if it were comparable would be misleading. The attempt, therefore, to show in detail the annual variations in the earnings of different classes of corporations has been given up.

From the reported net income are deducted taxes and deficits; these are, for the most part, exact amounts. Thereafter, an adjustment is made for known discrepancies in the reported net earnings, and these

[1] *Statistics of Income* for 1916, p. 15; for 1917 and 1918.

[2] Commissioner of Internal Revenue, *Annual Report*, 1913, p. 505; 1914, p. 624; 1915, p. 746; 1916, p. 661; 1917, p. 773.

amounts are then divided between dividends and surplus. This division is made in accordance with the results of a study of 205 industrial corporations, 15 commercial corporations, 62 public utility corporations, the banking reports of the Comptroller of the Currency, and the railroad reports of the Interstate Commerce Commission.[1] The division between dividends and surplus as found in each of these samples has been weighted in accordance with the relative amounts of the net earnings, and a weighted average for each year has been applied to the estimated total earnings.

The results of these computations are presented in the following table:—

[1] See footnotes, Table 25A, for detailed references.

TABLE 25A

ESTIMATED TOTAL DIVIDENDS PAID AND TOTAL SURPLUS RETAINED BY ALL CORPORATIONS

1910 to 1920

(Millions of Dollars)

Year	I Total reported income of corporations having a net income	II Excise and income taxes paid by corporations	III Net earnings of corporations having net incomes	IV Deficits of corporations having no net incomes [b]	V Net earnings of all corporations	VI Approximate net income of all corporations after known adjustments	VII Estimated division of net earnings between dividends and surplus [e]	VIII Estimated total dividends [f]	IX Estimated corporation surplus [g]
1910...	$3,761 [a]	$ 38 [a]	$3,723	$ 687	$3,036	$3,436 [c]	58.8%–41.2%	$2,020	$1,416
1911...	3,503	35	3,468	649	2,819	3,219 [c]	66.6 –33.4	2,144	1,075
1912...	4,151	42	4,109	590	3,419	3,819 [c]	71.9 –28.1	2,746	1,073
1913...	4,714	47	4,667	928	3,739	4,000 [d]	69.5 –30.5	2,780	1,220
1914...	3,940	39	3,901	1,217	2,684	2,800 [d]	77.9 –22.1	2,181	619
1915...	5,310	53	5,257	1,027	4,230	4,230	56.2 –43.8	2,377	1,853
1916...	8,766	172	8,594	657	7,937	7,937	42.7 –57.3	3,389	4,548
1917...	10,730	2,142	8,588	630	7,958	7,958	50.2 –49.8	3,995	3,963
1918...	8,362	3,159	5,203	690	4,513	4,513	56.9 –43.1	2,568	1,945
1919...	9,411	2,175	7,236	996	6,240	6,240	63.1 –36.9	3,937	2,303
1920...	7,100	2,600	4,500	1,000	3,500	3,500	65.0 –35.0	2,275	1,225

[a] *Statistics of Income*, 1916, p. 15. Originally reported in the *Annual Reports* of Commissioner of Internal Revenue, 1911, pp. 70–80, 1912, pp. 74–85, 1913, pp. 91–102, 1914, pp. 98–109. These figures cover the years 1910, 1911, 1912 and 1913. For 1914 and 1915, there are no data. The totals are based on the amount of the tax, 1915, pp. 188, 189, 1916, pp. 204, 205.

The years 1909, 1910, 1911 and 1912 are obtained from data collected under the excise tax, section 38 of the Act of August 5, 1909. This Act permitted the deduction of income received as dividends from other corporations, and also excluded income of less than $5,000. The amounts for 1913 to 1917 are obtained from data collected under the income-tax law of October 3, 1913, and subsequent income-tax laws, and included all income of corporations, including specifically income received as dividends from other corporations. The income-tax law for 1918 again permitted the deduction of income received as dividends from other corporations.

The tax rate was increased in 1916 from 1 per cent to 2 per cent. (Act of September 8, 1916.) For the year 1917, the rate was again increased (War Revenue Act of October 3, 1917) to a normal tax of 4 per cent, plus war excess-profits taxes. For 1917, see *Statistics of Income*, 1917; for 1918, see *Statistics of Income*, 1918; for 1919, see *Statistics of Income*, 1919.

[b] For the years 1916 to 1918, losses are reported in *Statistics of Income*. Prior to 1916 no such figures are given. A deduction for losses in the years prior to 1916 should therefore be made. A comparison of the deficits reported in 1916 and 1917 with the amounts of liabilities of enterprises that failed, reported in *Dun's Review*, suggests that the liabilities were about 3.4 times the deficits. If this ratio is applied, then the losses may be estimated as follows:

ESTIMATED DEFICITS OF CORPORATIONS HAVING NO NET INCOME

Year	Number of commercial failures (Dun's)	Amount of liabilities (Dun's) (Millions)	Number of corporations reporting no income, or actual deficit	Actual amount of deficit (Millions)	Estimated amount of deficit (Millions)
1910.....	12,652	$202	Not comparable	$	$ 687
1911.....	13,441	191	" "		649
1912.....	15,452	203	" "		690
1913.....	16,037	273	128,043		928
1914.....	18,280	358	155,240		1,217
1915.....	22,156	302	145,532		1,027
1916.....	16,993	196	134,269	657	
1917.....	13,885	182	119,347	630	
1918.....	9,982	163	115,518	690	
1919.....	6,451	113		996	
1920.....	8,881	295			1,000

The total number of corporations reporting and the number reporting taxable income are as follows:

Year	Total corporations	Number of corporations reporting taxable income		
		Over $5,000 only	All corporations	Excluding subsidiaries
1910	270,202	54,040		
1911	288,352	55,129		
1912	305,336	61,116		
1913	316,909		188,886	
1914	329,445		174,205	
1915	336,443		190,911	
1916	341,253		206,984	
1917	351,426		232,079	
1918	317,579			202,061
1919	320,198			209,634
1920				

For the year 1915, it is reported (*Statistics of Income*, 1916, p. 15) that 30,000 corporations showing a deficit were included which should have been reported in 1914. This correction is made in the Table above.

The decrease in 1918 is due to consolidated returns, and for this reason is not included in computing the ratio between the losses reported for tax purposes and the failures reported by *Dun's Review*.

[c] Raised by $400 million to account for earnings of corporations under $5,000 which were not reported.

[d] The following samples of net earnings of identical corporations were used for the purposes of comparison:

EARNINGS OF IDENTICAL CORPORATIONS

(Millions of Dollars)

Year	205 industrial corporations	Professor Friday's sample of 251 corporations	Earnings of national banks (Comptroller of Currency)	Sample of 62 public utilities
1910	$ 383	$	$154	$ 84
1911	347	459	157	81
1912	385	513	149	86
1913	420	542	161	86
1914	315	415	149	87
1915	585	699	127	103
1916	1,045	1,402	158	119
1917	1,032	1,774	194	101
1918	777	1,591	212	61
1919	671		240	55
1920	672		282	

According to the samples of Industrials, the earnings for 1913 should be from 6 per cent to 9 per cent higher than in 1912. The earnings for 1914 should be about 25 per cent less than in 1913. There was a large increase in 1915 over 1914—about 70 per cent to 80 per cent. These figures are not to be taken as entirely typical, for railroads and public utilities vary in different proportions.

[e] The proportions into which net earnings are divided between dividends and surplus, according to samples, are as follows:

PROPORTIONS INTO WHICH NET EARNINGS ARE DIVIDED BETWEEN DIVIDENDS AND SURPLUS IN DIFFERENT INDUSTRIES

(Per cents)
(D = dividends; S = surplus)

Year	Financial [1]		Commercial [2]		Manufacturing and mining [3]		Public utilities [4]		Railroads [5]		Weighted average [6]	
	D	S	D	S	D	S	D	S	D	S	D	S
1910	69	31	55	45	55	45	61	39	62	38	58.8	41.2
1911	73	27	63	37	63	37	68	32	72	28	66.6	33.4
1912	81	19	67	33	67	33	73	27	82	18	71.9	28.1
1913	74	26	67	33	67	33	74	26	73	27	69.5	30.5
1914	81	19	51	49	79	21	76	24	92	8	77.9	22.1
1915	89	11	44	56	45	55	67	33	86	14	56.2	43.8
1916	73	27	34	66	37	63	63	37	42	58	42.7	57.3
1917	65	35	41	59	47	53	75	25	52	48	50.2	49.8
1918	61	39	49	51	55	45	87	13	65	35	56.9	43.1
1919	56	44	35	65	56	44	81	19	56	44	63.1	36.9
1920	52	48			64	36	74	26	46	54	(65.0	35.0)

[1] Based on National Banks. Reports of the Comptroller of the Currency.

[2] Based on 15 commercial corporations reported in *Moody's Manual* from 1914 to 1919. Previous to 1914, reports are inadequate, and the manufacturing ratio is used.

[3] Based on 200 corporations reported in *Moody's Manual* and supplied by certain banking institutions.

[4] Based on 62 public utility corporations reported in *Moody's Manual.*

[5] Based on reports of Interstate Commerce Commission and reports in *Moody's Manual* covering practically all railroads.

[6] In collecting the data on which Column VII is based, care has been taken to include in surplus only those amounts actually carried as such in the books. In conformity with this plan, special reserve accounts, reserves against bad debts, losses in inventory and depreciation have been excluded. This same method was followed in the earlier investigation of the genuineness of surplus accounts, so that the two computations have been made on the same basis.

These percentages have been weighted according to the estimated importance of each class of institutions, and the weighted average for each year is applied to the net earnings. 1920 is an approximation, since complete data are lacking.

/The *New York Journal of Commerce* reports the following amounts of dividends paid by industrial corporations each year. It does not explain how complete they are or whether they cover identical corporations. They are inserted for purposes of comparison.

Year	Dividends (Millions of dollars)	Index number
1911	$368	1.00
1912	394	1.07
1913	445	1.21
1914	436	1.18
1915	422	1.14
1916	546	1.48
1917	681	1.85
1918	645	1.75
1919	576	1.56
1920	599	1.63

These amounts are reported in the first issue of each year, giving three previous years. The amounts reported for the same year are not always identical and the latest figure reported has been taken.

a Professor Friday has made a similar computation of surplus (*Profits, Wages and Prices*, p. 64) and it is of interest to compare his results with those given in this study:

COMPARISON OF PROFESSOR FRIDAY'S RESULTS WITH THOSE OF THE BUREAU

(Millions of Dollars)

Year	Total net earnings		Dividends		Surplus	
	Bureau	Friday	Bureau	Friday	Bureau	Friday
1910	$3,436	$3,360	$2,020	$2,290	$1,416	$1,070
1911	3,219	3,213	2,144	2,226	1,075	988
1912	3,819	3,832	2,746	2,498	1,073	1,334
1913	4,000	4,340	2,780	2,871	1,220	1,468
1914	2,800	3,711	2,181	2,412	619	1,299
1915	4,230	5,184	2,377	2,595	1,853	2,590
1916	7,937	8,594	3,389	3,784	4,548	4,810
1917	7,958	8,587	3,995	4,652	3,963	3,936
1918	4,513	6,300 Est.	2,568	4,250 Est.	1,945	2,050 Est.
1919	6,240	6,700 Est.	3,937	3,900 Est.	2,303	2,800 Est.

The main discrepancies are as follows:

Total net earnings differ, because Professor Friday has taken the published figures without the emendations made by the Bureau and for which the reasons have been discussed. This results in wide variations for 1913, although the percentages are quite close. For 1914, Professor Friday's total is higher than the Bureau's, as is also his estimate of surplus. The proportions are strikingly different, although the proportion which Professor Friday quotes for industrials (*Profits, Wages and Prices*, p. 62) is very close to that found in the sample of the Bureau. In the years 1916 and 1917, for which better data exist, the two estimates are in close agreement, and for 1918, Professor Friday made an advance estimate, whereas the Bureau has had the advantage of the recently published statistics.

§ 25e. Conclusions

If the corporate surpluses for each year are taken at 85 per cent of their face value, which is about the amount justified by the considerations

previously mentioned, then the final corporate surplus, which is to be counted as part of the National Income, will stand as follows:

TABLE 25B

ESTIMATE OF ACTUAL SAVINGS IN THE FORM OF CORPORATE SURPLUS

1910 to 1920

(Millions of dollars)

Year	Corporate surplus [a]	Estimated actual savings
1910	$1,416	$1,204
1911	1,075	914
1912	1,073	912
1913	1,220	1,037
1914	619	526
1915	1,853	1,575
1916	4,548	3,866
1917	3,963	3,369
1918	1,945	1,653
1919	2,303	1,958
1920	1,225	1,041

[a] Table 25A.

CHAPTER 26

SUMMARY OF PART II

§ 26a. The Total Income of the United States, 1910 to 1919

The total income of the United States, as computed in the preceding sections, may now be summarized on page 331.

§ 26b. The Degree of Error in the Estimate

It is advisable to repeat the caution that these amounts are all estimates constructed from a large amount of data of varying reliability. Table 26B shows first the range within which the income for each year probably lies. This range was estimated in the same way that the mathematical "probable error" is computed, but it was not possible to do this, in mathematical terms. It is, therefore, to be regarded simply as a guessed at "probable error." Next, is shown the greatest error that could be reasonably expected, on the assumption that each item varied according to the widest indications from the figures as given, and that all these variations were in the same direction. Thus is indicated the outside limits within which the National Income must fall, if all the errors judged possible by the Bureau have been committed, and committed with no offsetting of one error by another. Evidently, the chances that this has actually occurred are extremely small.

TABLE 26A

INCOME OF THE PEOPLE OF THE UNITED STATES ACCORDING TO THE ESTIMATE BY INCOMES RECEIVED

1910 to 1920

Year	Income of persons receiving under $2,000		Income of persons receiving over $2,000		Total number of persons (Thousands)	Total individual income (Billions of dollars)	Corporate surplus (Billions of dollars)	Total national income
	Amount (Billions of dollars)	Persons (Thousands)	Amount (Billions of dollars)	Persons (Thousands)				
1910	$20.2	32,412	$ 9.8	1,411	33,823	$30.0	$1.2	$31.2
1911	20.6	32,973	9.6	1,379	34,352	30.2	0.9	31.1
1912	21.6	33,399	9.9	1,411	34,810	31.5	0.9	32.4
1913	22.3	33,635	10.2	1,443	35,078	32.5	1.0	33.5
1914	22.3	33,422	9.9	1,444	34,866	32.2	0.5	32.7
1915	22.9	32,907	11.4	2,008	34,915	34.3	1.6	35.9
1916	26.2	34,906	15.6	2,748	37,654	41.8	3.9	45.7
1917	29.8	34,520	20.9	4,213	38,733	50.7	3.4	54.1
1918	37.0	35,961	23.3	4,961	40,922	60.3	1.7	62.0
1919	39.5	33,913	25.3	5,608	39,521	64.8	2.0	66.8
1920	43.8	34,076					1.0	

TABLE 26B

THE RANGE WITHIN WHICH THE INCOME OF THE PEOPLE OF THE UNITED STATES PROBABLY LIES

1910 to 1919

(Billions of dollars)

Year	Final estimate	Probable range within which the actual income falls	Estimated range beyond which actual income cannot reasonably lie
1910	31.2	30.0–32.4	25.9–36.5
1911	31.1	29.8–32.4	25.9–36.3
1912	32.4	31.1–33.7	27.2–37.6
1913	33.5	32.2–34.8	27.9–39.1
1914	32.7	31.4–34.0	26.7–38.7
1915	35.9	34.6–37.2	29.7–42.1
1916	45.7	44.3–47.1	40.5–50.9
1917	54.1	52.5–55.6	46.9–61.2
1918	62.0	60.1–63.5	53.5–70.2
1919	66.8	64.2–68.5	58.6–73.1
1920			

§ 26c. Percentage Division of Number of Persons Having over $2,000 and Under $2,000 Income per Year

The percentage of persons having incomes over and under $2,000 and the percentage of the total income which they received is next shown:—

TABLE 26C

PERCENTAGE OF PERSONS HAVING INCOMES OVER AND UNDER $2,000 AND PERCENTAGE OF THE TOTAL INCOME WHICH THEY RECEIVED

1910 to 1919

Year	Per cent of total persons having incomes		Per cent of income received by persons having	
	Over $2,000	Under $2,000	Over $2,000	Under $2,000
1910	4%	96%	33%	67%
1911	4	96	32	68
1912	4	96	31	69
1913	4	96	31	69
1914	4	96	31	69
1915	6	94	33	67
1916	7	93	37	63
1917	11	89	41	59
1918	12	88	39	61
1919	14	86	39	61
1920				

It will be seen that while the percentage of persons having incomes over $2,000 increased from about 4 per cent in 1910 to 1914, to about 14 per cent in 1919, the percentage of the income which they received increased only from about 32 per cent to about 40 per cent during this period. The increase in the number of persons having incomes over $2,000 is doubtless closely connected with the rise in prices, and does not denote a corresponding improvement in their well-being.

§ 26d. The Percentage of the Total Income Obtained by the Highest 5 Per Cent of Income Receivers

Using this table as a basis, and checking with the work in Part III, it is possible to make a conjectural estimate of the percentage of the total income which the highest 5 per cent of income receivers obtained.

The method employed has been to subtract from the number of persons having incomes over $2,000 such a number as will reduce the remainder to 5 per cent of the gainfully employed. The average income of those who are subtracted is then computed in accordance with the distribution of the entire income as shown in Part III. While no claim to strict accuracy can be made for the results, the error is probably not sufficient to alter the trend shown. This percentage is shown including and excluding farmers because for many purposes farmers make a class apart from the remainder of the industrial community. Corporate surplus is left out of this computation for it is not possible to locate the recipients with any degree of accuracy (see Table 26D).

§ 26e. The Position of the Farmer

The per cent of the National Income which was received by farmers each year is next shown. The number of farmers was reported in 1910 as 6,361,000 and in 1920 as 6,460,000—a gain which is so small as to be practically negligible (see Table 26E).

§ 26f. Income in Each Year in Terms of Constant Purchasing Power

Did the income of the country increase during the decade when measured in terms of serviceable goods? In order to answer this question satisfactorily a rather elaborate computation has been found necessary. There is no satisfactory price index which can be applied indiscriminately to all products; indeed, the variations of price changes in different classes of commodities is a striking feature of the decade. In order to meet this difficulty, the income of the country was divided into four classes:—

1. Expenditures by persons having incomes over $2,000.
2. Expenditures by persons having incomes under $2,000.

TABLE 26D

PER CENT OF TOTAL INCOME OBTAINED BY THE HIGHEST FIVE PER CENT OF INCOME RECEIVERS

1913 to 1919

Year	Including farmers		Per cent of total	Excluding farmers		Per cent of total
	Total individual income	Estimated income received by highest 5 per cent of income receivers		Total individual income	Estimated income received by highest 5 per cent of income receivers	
	(Billions of dollars)			(Billions of dollars)		
1913	$32.5	$10.6	33%	$28.3	$ 9.9	35%
1914	32.2	10.3	32	28.0	9.6	34
1915	34.3	11.1	31	29.6	10.4	35
1916	41.8	14.3	34	36.0	12.8	36
1917	50.7	14.7	29	41.9	13.6	33
1918	60.2	15.4	25	49.7	13.9	28
1919	64.7	15.5	24	53.8	14.4	27
1920						

TABLE 26E

PER CENT OF THE NATIONAL INCOME RECEIVED BY FARMERS

Year	Total national income	Farmers' income	Percentage of national income received by farmers
	(Billions of dollars)		
1910	$31.2	$ 3.95	12.7
1911	31.1	3.70	11.9
1912	32.4	4.00	12.3
1913	33.5	4.20	12.5
1914	32.7	4.20	12.8
1915	35.9	4.70	13.1
1916	45.7	5.80	12.7
1917	54.1	8.80	16.3
1918	62.0	10.45	16.9
1919	66.8	10.85	16.2
1920		7.20	

3. War expenditures.

4. Construction expenditures.

For each of these divisions, the most plausible index number was found:

1. An index number of costs of living of persons having incomes over $2,000 was constructed by the Bureau. (Chap. 2, § 2c.)

2. For persons with incomes less than $2,000, the index number of the cost of living of the Bureau of Labor Statistics, *Monthly Labor Review*, June, 1920, p. 79, was used. The figures used are for June of each year. The years 1910 to 1912 have been compiled by this Bureau on a basis comparable to that used by the Bureau of Labor Statistics. (Chap. 2, § 2b.)

3. An index number was constructed from selected items of materials used in war, as estimated by the War Industries Board. (*History of Prices During the War*, 1919.)

4. An index number of construction was obtained from the American Telephone and Telegraph Company.

These index numbers cannot well be carried back of the year 1913. Prior to that year, the data are too uncertain to permit of even the crude methods employed for the later years. However, the general price level did not alter greatly during the years 1910 to 1913, so that an application of any legitimate index number of prices and any reasonable subdivision of the income would not alter the final result to any marked degree.

Taking 1913 as the basic year, computation gives the National Income for each year in terms of dollars of constant purchasing power as shown in Table 26G.

TABLE 26F

CONJECTURAL EXPENDITURE OF THE ANNUAL INCOME, AND PRICE INDEX FOR EACH TYPE OF EXPENDITURE

Year	Total income	Expenditures by persons having incomes over $2,000		Expenditures by persons having incomes under $2,000		Expenditures for war		Expenditures for construction	
		Billions of dollars	Price index	Billions of dollars	Price index	Billions of dollars	Price index	Billions of dollars	Price index
1910	$31.2	$ 6.0	99	$19.6	98			$5.6	97
1911	31.1	6.0	99	20.1	98			5.0	97
1912	32.4	6.0	100	20.8	99			5.6	99
1913	33.5	6.1	100	21.6	100		100	5.8	100
1914	32.7	5.8	101	21.8	101	$ 0.7	93	4.4	100
1915	35.9	7.0	100	22.5	103	2.0	101	4.4	103
1916	45.7	10.0	108	24.7	110	4.5	135	6.5	126
1917	54.1	14.0	123	27.6	129	9.5	188	3.0	155
1918	62.0	15.0	141	30.7	158	14.6	195	1.7	172
1919	66.8	16.5	165	34.8	177	9.0	200	6.5	191
1920			191 [a]		205 [b]				252

[a] Same ratio of increase as shown in price index for expenditures by persons having under $2,000.
[b] Average of December, 1919, June and December, 1920, June being the high point for the year.

TABLE 26G

NATIONAL INCOME AT PRICE LEVEL OF 1913

(Base Year: 1913)

1910 to 1919

Year	Total income (Billions of dollars)	Weighted index number of prices	Income at price level of 1913 (Billions of dollars)
1910	$31.2	98.0	$31.8
1911	31.1	98.0	31.7
1912	32.4	99.1	32.7
1913	33.5	100.0	33.5
1914	32.7	100.6	32.5
1915	35.9	102.3	35.1
1916	45.7	113.7	40.2
1917	54.1	136.1	39.7
1918	62.0	160.7	38.6
1919	66.8	177.7	37.6
1920			

§ 26g. The Average Income per Capita in Each Year

The next table shows the average income per capita of the entire popupation and of the gainfully employed. The entire population has been interpolated according to a method devised by Mr. King, of which the details are shown in Chapter 2, § 2a.

The number of the "gainfully employed" is uncertain, owing to the divergent ways of counting the persons included under agricultural labor. It seems certain that different standards have been used by the Census enumerators in determining whether a housewife or member of the family who helps in the fields intermittently or only for a few days during the harvest season should or should not be included. On account of this difficulty (and it appears to invalidate any close comparison between the totals of 1910 and the estimated totals of 1920), the number of farm laborers has been kept at a constant figure. In a measure, this comes nearer expressing the truth than any other arbitrary interpretation, for there is much evidence to indicate that during 1916 to 1919, when farm laborers were drafted into other industries, their places were taken by members of the family who are normally not included among the gainfully employed. This view was taken by Mr. Gray Silver in explaining the large increase of farmers' income in the years 1917 to 1919.[1]

The number of gainfully employed which is presented is the number *actually* employed in each year, as distinguished from the number attached

[1] See Vol. I, page 38.

to the industry. The former number is always smaller than the latter, and in times of depression is apt to be considerably smaller. It reflects in a broad way the changes in degree of unemployment.[1]

The results are presented in several ways: (1) per capita income for the whole population, (2) per capita income for the gainfully employed, and (3) both sets of per capita figures are given first in money of current and second in money of constant purchasing power. Needless to say, changes in economic welfare are best approximated by the figures from which the price fluctuations have been eliminated.

TABLE 26H

PER CAPITA INCOME AND ITS PURCHASING POWER AT THE PRICE LEVEL OF 1913

Year	Income per capita of the entire population			Income per capita of the gainfully employed		
	Number of persons	Income per capita	Purchasing power at 1913 price level	Number of persons	Income per capita	Purchasing power at 1913 price level
	(Millions)	(Dollars)		(Millions)	(Dollars)	
1910	92.23	$338	$345	33.82	$ 923	$ 940
1911	93.81	332	338	34.35	907	923
1912	95.34	340	343	34.81	931	939
1913	97.28	344	344	35.08	955	955
1914	99.19	330	328	34.87	936	932
1915	100.43	357	349	34.91	1,028	1,005
1916	101.72	449	395	37.65	1,214	1,068
1917	103.06	525	385	38.73	1,397	1,025
1918	104.18	595	371	40.92	1,515	943
1919	104.85	637	359	39.52	1,690	951
1920						

[1] In comparing it to the Census figures our figures for the number of gainfully employed for 1910 and in 1920, two items should be kept in mind: (1) The Census includes 3,100,000 farm laborers working on home farms, who are not included here. (2) The Census figures include all those attached to an industry, whereas only those actually at work are included here. We estimated that about 3 per cent are normally unemployed, that is to say, about one million persons.

PART III

THE PERSONAL DISTRIBUTION OF INCOME IN THE UNITED STATES

By

FREDERICK R. MACAULAY

ASSISTED BY

E. GAIL BENJAMIN

CHAPTER 27

THE PROBLEM

What is the frequency distribution of annual income among personal income recipients in the United States? Before we can give an intelligent answer to this question, we must formulate it more definitely by indicating certain connotations which logic or expediency leads us to attach to some of its terms.

By *income* it seems desirable to mean actual money income, plus the estimated money value of the more important of those items of commodity or service income on which a money value is ordinarily placed. Two of the most important items which are thus included are the annual rental values of owned homes and the value of farm produce consumed by farmers' families.

In line with the ordinary convention, we have excluded from our definition of *income*, that income, whether monetary or non-monetary, which a wife receives from her husband or a child from its parents.[1] Not only is such exclusion practically expedient but it is also theoretically defensible and that quite apart from the fact that a money value is not ordinarily placed on the services of wife or child, wages of housekeepers to the contrary notwithstanding.

The frequency distribution resulting from the exclusion of such quasi incomes will be less heterogeneous and more significant and interpretable than the distribution which would result from inclusion. For the relation of the incomes of wives and children to the economic struggle is derived and secondary, while that of most other incomes is direct and primary. Now, though the distribution of income among persons is not synonymous with distribution among the factors of production, the two problems are very closely related. An individual's income may be thought of as made up of wages, rent, interest and dividends, profits, and gifts or allowances. If we omit this last type of income, the problem of factorial distribution proposes an investigation of how and why the individual received what remains. Even if gifts and allowances admitted of any such systematic and reasoned explanation as may be given of rent, wages, etc., the explanation would be of a totally different kind. Hence, for the purposes of this investigation, it seems undesirable to classify as *income*, the receipts,

[1] That is, while such income has, of course, been counted in the first instance as income of the husband or parent it has not been re-counted as income of the wife or child.

whether monetary or non-monetary, of those persons receiving merely allowances or gifts.[1]

Similar considerations have led us to think of an *income recipient* as an individual rather than a family. Just as it is the husband and not the wife, the parent and not the child, so it is the individual and not the family who, as an income receiver, comes into direct economic relationship with the machinery of distribution.

The chief argument in favor of family rather than individual treatment of the frequency distribution is based upon the idea that, though income accrues to the individual and not the family, the family is a more significant unit of economic need than the individual. But this is a different approach to the question and has, of course, no intimate relation to the problem of factorial distribution. Moreover, we must remember that if we are going to improve appreciably upon the individual, even as a need unit, we cannot stop with actual biological families with their great variation in size and constitution, but must introduce the concept of the theoretical family—father, mother and three children, for example. This last concept is, in its raw form, quite unusable. The population is not made up of such theoretical families. We may discuss what a family of five *ought* to get to maintain a decent standard of living, but we cannot divide the actual population into families of five and discuss what these non-existent hypothetical families actually do get. There remains the alternative of expressing actual families in terms of some *need* unit such as the "ammain." [2] While this last procedure would probably yield an extremely interesting distribution based upon *need* units, it is impractical to attempt any such solution with the data available.[3]

Though a distribution of income among actual biological families would appear to be somewhat less enlightening and interpretable than a distribution by individuals or by ammains, it would have its own peculiar interest and we would have attempted its construction had the data been adequate for such a purpose. Most of the data bearing on income distribution are in the individual form; wages distributions, for example, are

[1] Of course if the wife or child has "independent" income, that income is no longer of the nature of a gift or allowance even though it may arise from property originally deeded by the husband or father. It is now explainable in terms of rent, interest, etc.

If *income* be defined as above, the term *personal income recipient* will correspond closely to the census expression *person gainfully employed*. Perhaps the most important difference is that we do not and the Census does include as separate income recipients, farm laborers working on the home farm.

[2] *Ammain* is a word coined by W. I. King and E. Sydenstricker and defined by them, for any given class of people, as "a gross demand for articles of consumption having a total money value equal to that demanded by the average male in that class at the age when his total requirements for expense of maintenance reach a maximum." *Measurement of Relative Economic Status of Families*. Quarterly Publications of the American Statistical Association, Sept., 1921, p. 852.

[3] It is of course quite possible to estimate the *average* per ammain income, as has been done by Mr. King; the total income of the people can be divided by the estimated number of ammains in the population. See pages 233 and 234.

almost without exception in that form. Now to estimate the frequency distribution of income among families from data which, in the first place, are in the individual form and, in the second place, are extremely inadequate for estimating even the distribution among individuals, could only increase the degree of uncertainty in our results.

A few words explaining the reason for introducing the next chapter at this point are not out of place here. The data upon which an estimate of even the *individual* distribution of income in the United States must be based impress one as being in such shape that it is impossible to arrive at more than the roughest sort of approximation by any mere direct adding process. Some more ingenious plan would seem almost necessary. For example, would it not be possible to formulate a general mathematical "law" for the distribution of incomes which law might then be used for "adjusting" the tentative and hypothetical results obtained from piecing together the existing scanty and inadequate material?

The possibility and desirability of mathematically describing the frequency distribution of income would seem intimately tied up with the case for mathematically describing error distributions and statistical distributions in general. The fact that, in our problem, the "law" would be largely derived from the same data as those which were to be "adjusted" need not greatly disturb us. The procedure of adjusting observations in the light of a mathematical expression derived from the same observations is not novel. A number of attempts, one of which has become world-famous, have been made to demonstrate that the distribution of income follows a definite mathematical law. However, the next chapter will show why we fear that no rational and useful mathematical law will soon be formulated.

CHAPTER 28

PARETO'S LAW AND THE GENERAL PROBLEM OF MATHEMATICALLY DESCRIBING THE FREQUENCY DISTRIBUTION OF INCOME

The problem of formulating a mathematical expression which shall describe the frequency distribution of income in all places and at all times, not only closely, but also elegantly, and if possible rationally as opposed to empirically, has had great attractions for the mathematical economist and statistician. The most famous of all attempts at the solution of this fascinating problem are those which have been made by Vilfredo Pareto. Professor Pareto has been intensely interested in this subject for many years and the discussion of it runs through nearly all of his published work. The almost inevitable result is that "Pareto's Law" appears in a number of slightly different forms and Professor Pareto's feelings concerning the "law" run all the way from treating it as inevitable and immutable to speaking of it as "merely empirical."

In its best known, most famous, and most dogmatic form, Pareto's Law runs about as follows:

1. In all countries and at all times the distribution of income is such that the upper (income-tax) ranges of the income frequency distribution curve may be described as follows: If the logarithms of income sizes be charted on a horizontal scale and the logarithms of the numbers of persons having an income of a particular size or over be charted on a vertical scale, then the resulting observational points will lie approximately along a straight line. In other words, if

x = income size and
y = number of persons having that income or larger
then $\log y = \log b + m \log x$
or $y = bx^m$.[1]

2. In all countries and at all recent times the *slope* of this straight line fitted to the cumulative distribution, that is, the constant m in the equation $y = bx^m$, will be approximately 1.5.[2]

3. The rigidity and universality of the two preceding conclusions strongly

[1] If the cumulative distribution (cumulating from the higher towards the lower incomes as Pareto does) on a double log scale could be exactly described by the equation $y = bx^m$, the non-cumulative distribution could be described by the equation $Y = -mbx^{m-1}$.

[2] Strictly, *minus* 1.5, though Pareto neglects the sign.

suggest that the shape of the income frequency distribution curve on a double log scale is, for all countries and at all times, inevitably the same not only in the upper (income-tax) range but throughout its entire length.

4. If then the nature of the whole income frequency distribution is unchanging and unchangeable there is, of course, no possibility of economic welfare being increased through any change in the proportion of the total income going to the relatively poor. Economic welfare can be increased only through increased production. In other words, Pareto's Law in this extreme form constitutes a modern substitute for the Wages Fund Doctrine.

This is the most dogmatic form in which the "law" appears. In his later work Professor Pareto drew further and further away from the confidence of his first position. He had early stated that the straight line did not seem adequate to describe distributions from all times and places and had proposed more complicated equations.[1] He has held more strongly to the significance of the similarity of slopes but he has wavered in his faith that the lower income portions of the curve (below the income-tax minimum) were necessarily similar for all countries and all times. He has given up the suggestion that existing distributions are inevitable though still speaking of the law as true within certain definite ranges. To translate from his *Manuel* (p. 391): "Some persons would deduce from it a general law as to the only way in which the inequality of incomes can be diminished. But such a conclusion far transcends anything that can be derived from the premises. Empirical laws, like those with which we are here concerned, have little or no value outside the limits for which they were found experimentally to be true." Indeed Professor Pareto has himself drawn attention to so many difficulties inherent in the crude dogmatic form of the law that this chapter must not be taken as primarily a criticism of his work but rather as a note on the general problem of mathematically describing the frequency distribution of incomes.

Almost as soon as he had formulated his law Professor Pareto recognized the impossibility of extrapolating the straight line formula into the lower income ranges (outside of the income-tax data which he had been using). The straight line formula involves the absurdity of an infinite number of individuals having approximately zero incomes. Professor Pareto felt that this zero mode with an infinite ordinate was absurd. He believed that the curve must have a definite mode at an income size well above zero [2] and with a finite number of income recipients in the modal group.

[1] The inadequacy of these more complicated equations is discussed later. See pp. 348, 363 and 364.

[2] This is, of course, not absolutely necessary. It depends upon our definitions of *income* and *income recipient*. If we include the negligible money receipts of young children living at home we might possibly have a mode close to zero. There are few children who do not really earn a few pennies each year. Compare Chart 31A page 416.

Having come to the conclusion that the income frequency distribution curve must inevitably have a definite mode well above zero income and tail off in both directions from that mode, Professor Pareto was led to think of the possibilities of the simplest of all frequency curves, the normal curve of error. However, after examination and consideration, he felt strongly that the normal curve of error could not possibly be used. He became convinced that the normal curve was not the law of the data for the good and sufficient reason that the part of the data curve given by income-tax returns is of a radically different shape from any part of a normal curve.[1]

Professor Pareto finds a further argument against using the normal curve in the irrationality of such a curve outside the range of the data. The mode of the complete frequency curve for income distribution is at least as low as the minimum taxable income. Income-tax data prove this. However, a normal curve is symmetrical. Hence, if a normal curve could describe the upper ranges of the income curve as given by income-tax data then in the lower ranges it would cut the y axis and pass into the second quadrant, in other words show a large number of negative incomes.

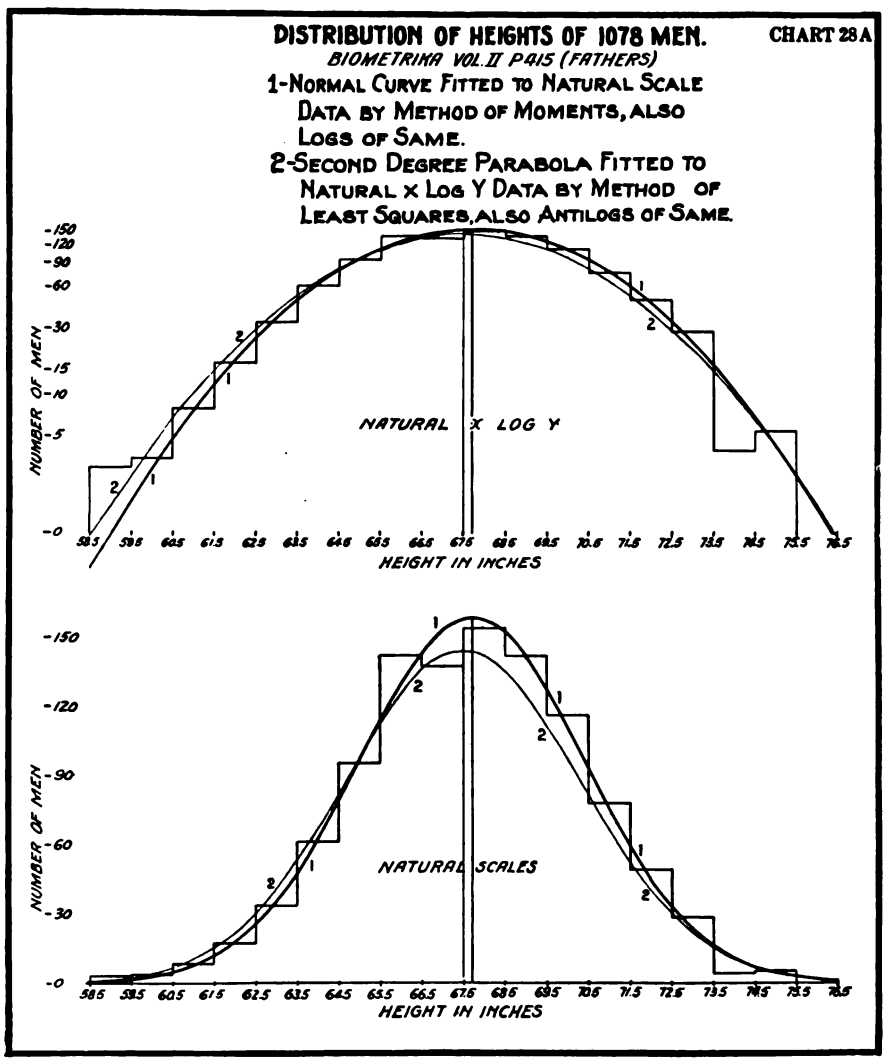
Now, aside from the fact that this whole argument is unnecessary if the data themselves cannot be described even approximately by a normal curve, Professor Pareto's discussion reveals a curious change in his middle term. If he had said that a symmetrical curve on a natural scale with a mode at least as low as the income-tax minimum would show *unbelievably large* negative incomes we could follow him but when he states that not only can there be no zero incomes but that there can be no incomes below "the minimum of existence" we realize that he has unconsciously changed the meaning of his middle term. Having examined a mass of income-tax data, all of which were concerned with *net money* income and from these data having formulated a law, he now apparently without realizing it, changes the meaning of the word income from *net money income* to *money value of commodities consumed*, and assumes that those who receive a *money* income less than a certain minimum must inevitably die of starvation.

[1] Though Pareto seems to have thoroughly understood this fact, his discussion is not altogether satisfactory. He states that the data for the higher incomes show a larger number of such incomes than the normal curve would indicate. This is hardly adequate. To have stated that the upper and lower ranges showed too many incomes *as compared with the middle range* would have been better. An easy way to realize clearly the impossibility of describing income-tax data by a normal curve is to plot a portion of the non-cumulative data on a *natural x log y* basis. When so charted the data present a concave shaped curve. However, if the data were describable by any part of a normal curve of error, they would show a convex appearance, or in the limiting case a straight line, as the equation of the normal curve of error $\left(y_x = y_o e^{\frac{-x^2}{2\sigma^2}}\right)$ becomes, on a natural x log y scale, $\log_e y_x = \log_e y_o - \frac{x^2}{2\sigma^2}$, or a second degree parabola whose axis is perpendicular to the x axis of coördinates.

The reader must note that the limiting straight line case mentioned above is on a *natural* x log y scale and not (as the Pareto straight line) on a *log* x log y scale. (Note concluded page 347.)

Children receive in general negligible *money* incomes. Many other persons in the community are in the same position. A business man may "lose money" in a given year, in other words he may have a negative money income. There seems no essential absurdity in assuming that a large number of persons receive money incomes much less than necessary to

(Note 1 page 346 concluded.)
Chart 28A showing curves fitted to observations on the heights of men illustrates the appearance of the normal curve on a natural scale and on a natural x log y scale. That chart also illustrates another fact of importance in this discussion, namely, that fitting to a different function of the variable gives a different fit.



support existence. When in 1915 Australia took a census of the incomes of all persons "possessed of property, or in receipt of income," over 14 per cent of the returns showed incomes "deficit and nil." [1]

Professor Pareto's realization of the impossibility of describing income distributions by means of normal curves led him to the curious conclusion that such distributions were somehow unique and could not be explained upon any "chance" hypothesis. "The shape of the curve which is furnished us by statistics, does not correspond at all to the curve of errors, *that is to say* [2] to the form which the curve would have if the acquisition and conservation of wealth depended only on chance." [3] Moreover, while Professor Pareto's further suggestion of possible heterogeneity in the data corresponds we believe to the facts, his reason for making such a suggestion, namely that the data cannot be adequately described by a normal curve, is irrelevant.[4] "Chance" data distributions are no longer thought of as necessarily in any way similar to the normal curve. Even error distributions commonly depart widely from the normal curve. The best known system of mathematical frequency curves, that of Karl Pearson, is intended to describe homogeneous material and is based upon a probability foundation, yet the normal curve is only one of the many and diverse forms yielded by his fundamental equation $\frac{d \log y}{dx} = \frac{x + a}{b_o + b_1 x + b_2 x^2}$.[5]

While Pareto's Law in its straight line form was at least an interesting suggestion, his efforts to amend the law have not been fruitful. His attempts to substitute $\log_e N = \log_e A - \alpha \log_e (x + a)$ or even $\log_e N = \log_e A - \alpha \log_e (x + a) - \beta x$ for the simpler $\log N = \log A - \alpha \log x$ have not materially advanced the subject.[6] The more complicated curves have the same fundamental drawbacks as the simpler one. Among other peculiarities they involve the same absurdity of an infinite number of persons in the modal interval and none below the mode. Along with the doubling of the number of constants, there comes of course the possibility of improving the fit within the range of the data. Such improvement is, however, purely artificial and empirical and without special significance, as can be easily appreciated by noticing the mathematical characteristics of the equation.

A number of other statisticians have at various times fitted different types of frequency curves to distributions of income, wages, rents, wealth,

[1] Compare Table 29A.
[2] My italics.
[3] *Manuel*, p. 385. See also *Cours*, pp. 416 and 417.
[4] Vid. *Cours*, pp. 416 and 417.
[5] Professor A. W. Flux in a review of Pareto's *Cours d'Economie Politique* (*Economic Journal*, March, 1897) drew attention to the inadequacy of Pareto's conception of what were and what were not "chance" data.
[6] Cf. *Cours*, vol. II, p. 305, note.

or allied data.[1] However, no one has advanced such claims for a "law" of *income*[2] distribution as were at one time made by Professor Pareto. When considering the possibility of helpfully describing the distribution of income by any simple mathematical expression, one inevitably begins by examining "Pareto's Law." It is so outstanding. Let us therefore examine Pareto's Law.

> 1. Do income distributions, when plotted on a double log scale, approximate straight lines closely enough to give such approximation much significance?

Before attempting to answer this question it is of course necessary to decide how we shall obtain the *straight line* with which comparisons are to be made.

Professor Pareto fitted straight lines directly by the method of least squares to the *cumulative* distribution plotted on a double log scale. The disadvantage of this procedure is that, though one may obtain the straight line which best fits the *cumulative* distribution, such a straight line may be anything but an admirable fit to the *non-cumulative* figures. For example, if a straight line be fitted by the method of least squares to Prussian returns for 1886 (as given by Professor Pareto) the total number of income recipients within the range of the data is, according to the fitted straight line, only 5,399,000 while the actual number of returns was 5,557,000, notwithstanding the fact that Prussia, 1886, is a sample which runs much more nearly straight than is usual. How bad the discrepancy may be where the data do not even approximate a straight line is seen in Professor Pareto's Oldenburg material. There the least-squares straight line fitted to the cumulative distribution on a double log scale gives 91,222 persons having incomes over 300 marks per annum while the data give only 54,309.

[1] Among others, Karl Pearson, F. Y. Edgeworth, Henry L. Moore, A. L. Bowley, Lucien March, J. C. Kapteyn, C. Bresciani, C. Gini, F. Savorgnan.

[2] Professor H. L. Moore, in his *Laws of Wages*, is concerned primarily with *wages* not *income*.

Professor J. C. Kapteyn has presented a pretty but somewhat hypothetical argument suggesting that the skewness in the income frequency curve should be such that plotting on a log x basis would eliminate it.

"In several cases we feel at once that the effect of the causes of deviation cannot be independent of the dimension of the quantities observed. In such cases we may conclude at once that the frequency curve will be a skew one. To take a single example:

"Suppose 1000 men to begin trading, each with the same capital; in order to see how their wealth will be distributed after the lapse of 10 years, consider first what will be their condition at some earlier epoch, say at the end of the fifth year.

"We may admit that a certain trader A will then only possess a capital of £100, while another may possess £100,000.

"Now if a certain cause of gain or loss comes to operate, what will happen?

"For instance: Let the price of an article in which both A and B have invested their capital, rise or fall. Then it will be evident that if the gain or loss of A be £10, that of B will not be £10, but £10,000; that is to say, the effect of this cause will not be independent of the capital, but proportional to it."

J. C. Kapteyn, *Skew Frequency Curves in Biology and Statistics*, p. 13.

The reason for this peculiarity of the fit to the cumulative distribution becomes clear when we remember that the least-squares straight line may easily deviate widely from the first datum point while a straight line giving the same number of income recipients as the data must necessarily pass *through* the first datum point.[1]

A straight line fitted in such a manner that the total number of persons and total amount of income correspond to the data for these items gives what seems a much more intelligible fit. Charts 28B to 28G show cumulative United States frequency distributions from the income-tax returns for the years 1914 to 1919 on a double log scale (Professor Pareto's suggestion). Two straight lines are fitted to each distribution—one a solid least-squares line fitted to the cumulative data points and the other a dotted line so fitted that the total number of persons and total amount of income correspond to the data figures. While the least-squares line may appear much the better fit to these cumulative data, a mere glance at Tables 28B to 28G will reveal the fact that such a line is, to say the least, a less interpretable fit to the non-cumulative distribution.[2] It is, of course, evident that neither line is in any year a sufficiently good fit to the actual non-cumulative distribution to have much significance. No mathematics is necessary to demonstrate this.[3]

[1] e. g. in the case of Prussia, 1886, the first datum point is x = "over 300M" and y = 54,309 persons.

[2] Professor Warren M. Persons discussed the fit of the *least-squares* straight line to Professor Pareto's Prussian data for 1892 and 1902 in the *Quarterly Journal of Economics*, May, 1909, and demonstrated the badness of fit of that line to those data.

[3] The income returned for the years 1914 and 1915 was estimated from the *number* of returns. *Income* is not given in the reports for those years.

In fitting straight lines to the data of Tables 28B to 28G the lowest income interval (in which married persons making a joint return are exempt) has always been omitted. To have included in our calculations these lowest intervals would have increased still further the badness of the fit in the other intervals.

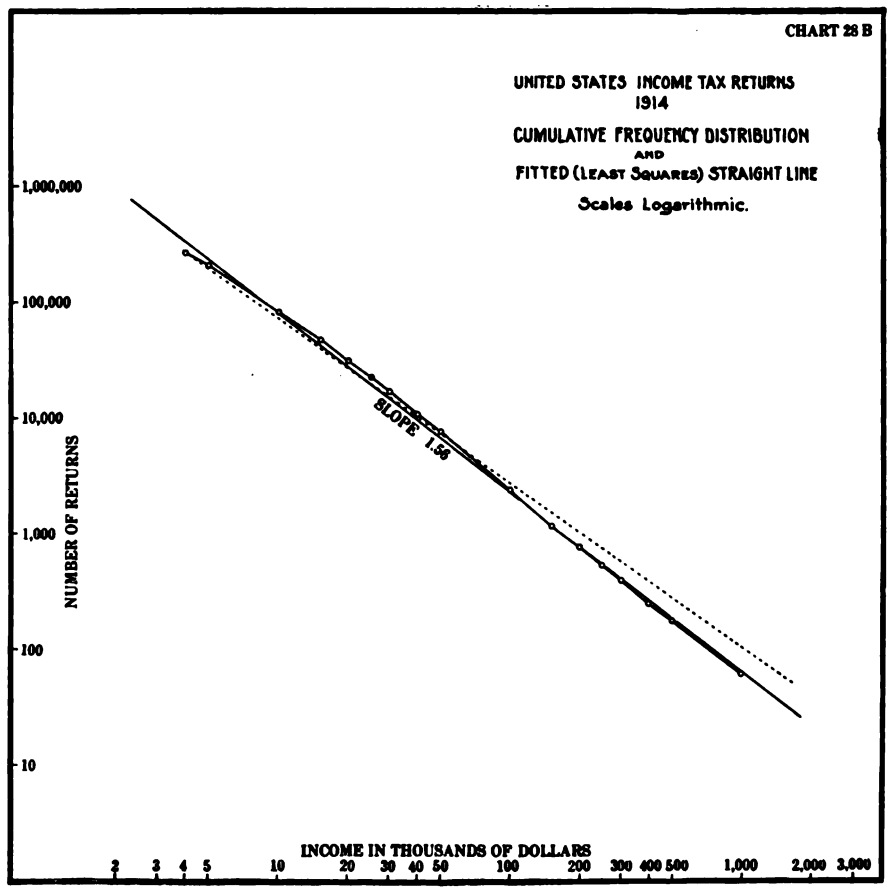


CHART 28 B
UNITED STATES INCOME TAX RETURNS
1914
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic.
SLOPE 1.56
NUMBER OF RETURNS
1,000,000
100,000
10,000
1,000
100
10
INCOME IN THOUSANDS OF DOLLARS
2 3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000 3,000

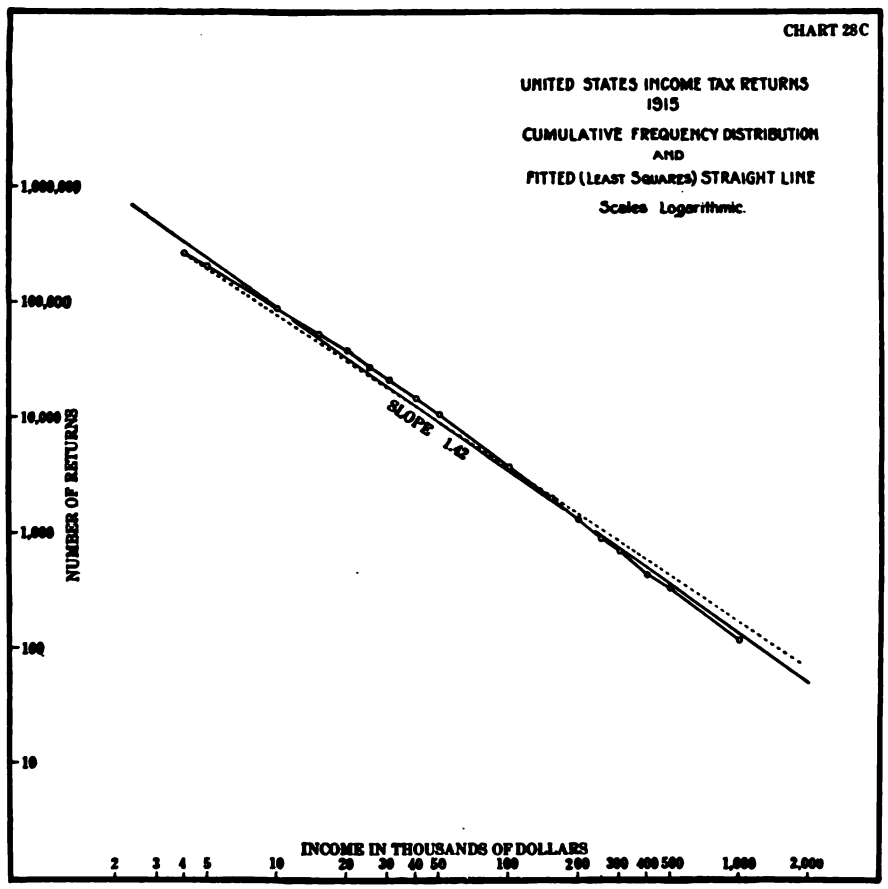


CHART 28C
UNITED STATES INCOME TAX RETURNS
1915
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic.
SLOPE 1.62
NUMBER OF RETURNS
1,000,000
100,000
10,000
1,000
100
10
INCOME IN THOUSANDS OF DOLLARS
2 3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000

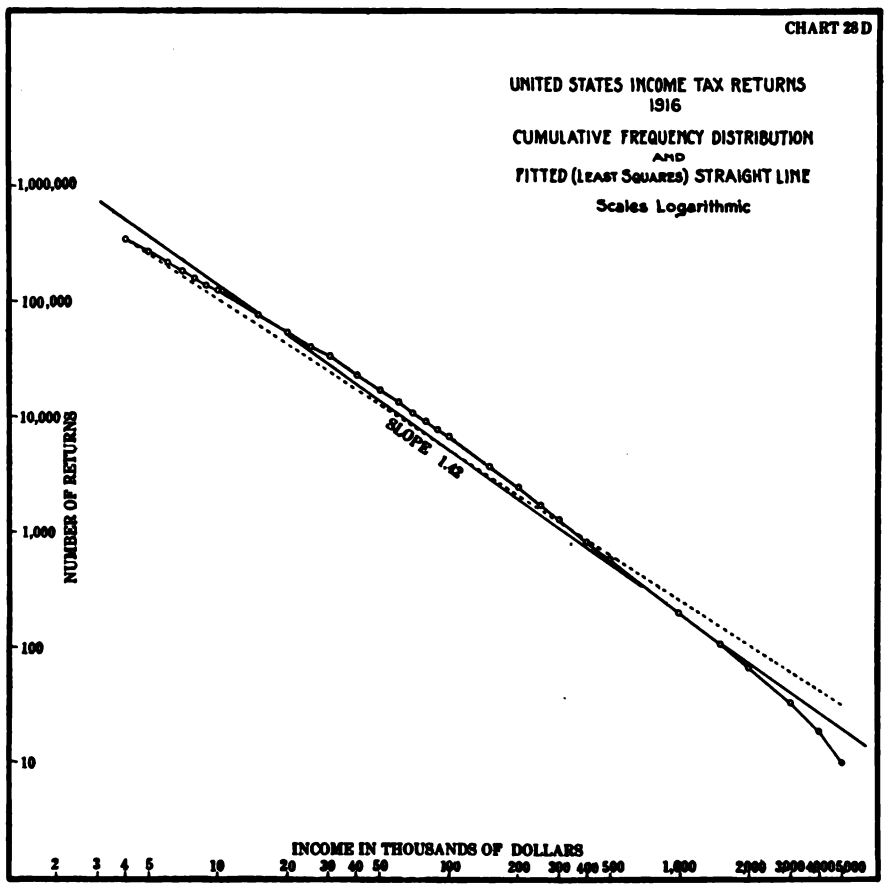


CHART 28 D
UNITED STATES INCOME TAX RETURNS
1916
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic
1,000,000
100,000
10,000
1,000
100
10
NUMBER OF RETURNS
SLOPE 1.43
INCOME IN THOUSANDS OF DOLLARS
2
3
4
5
10
20
30
40
50
100
200
300
400
500
1,000
2000
3000
4000
5000

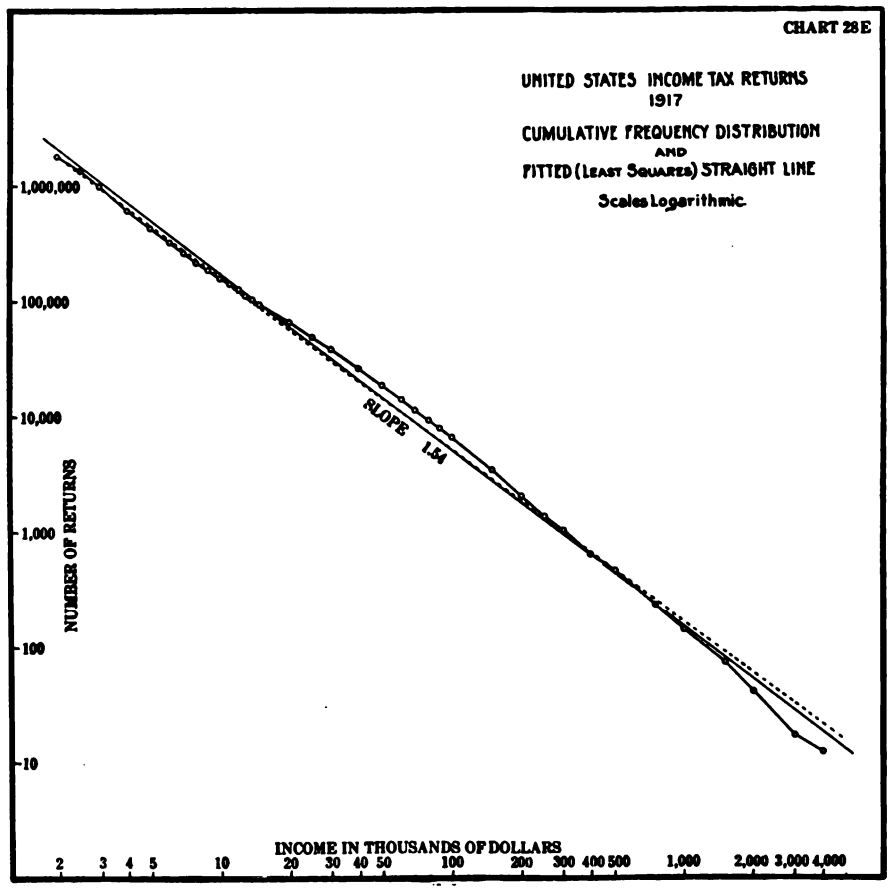


CHART 28E
UNITED STATES INCOME TAX RETURNS
1917
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic
SLOPE 1.54
NUMBER OF RETURNS
1,000,000
100,000
10,000
1,000
100
10
INCOME IN THOUSANDS OF DOLLARS
2 3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000 3,000 4,000

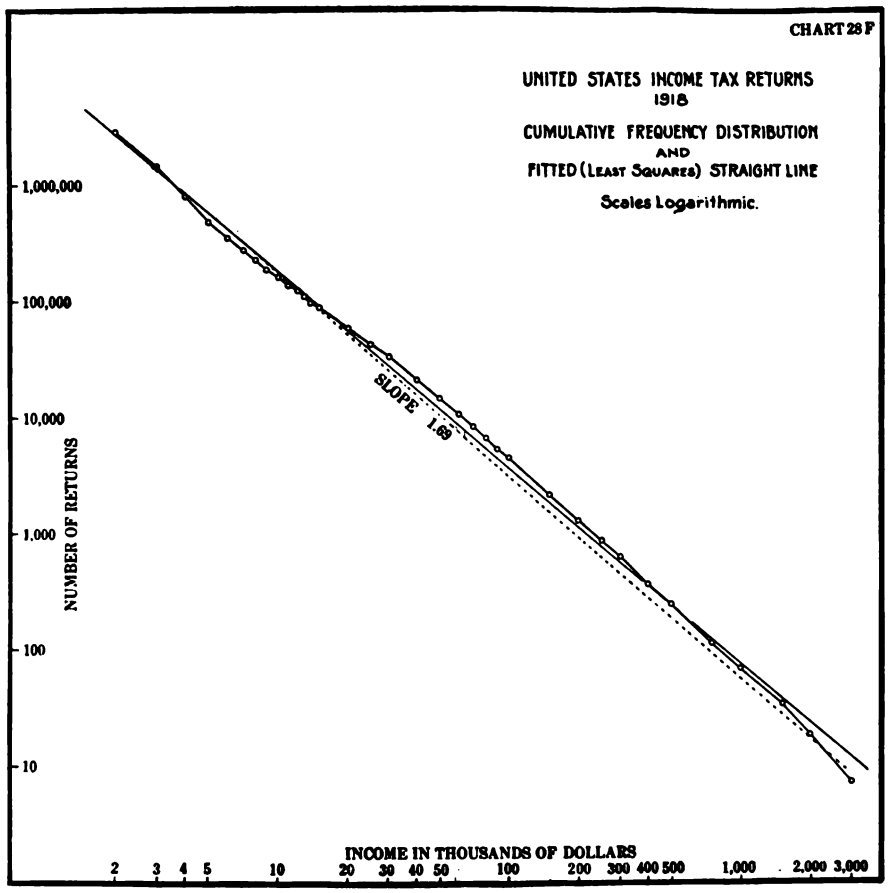


CHART 28 F
UNITED STATES INCOME TAX RETURNS
1918
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic.
SLOPE 1.65
NUMBER OF RETURNS
1,000,000
100,000
10,000
1,000
100
10
INCOME IN THOUSANDS OF DOLLARS
2 3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000 3,000

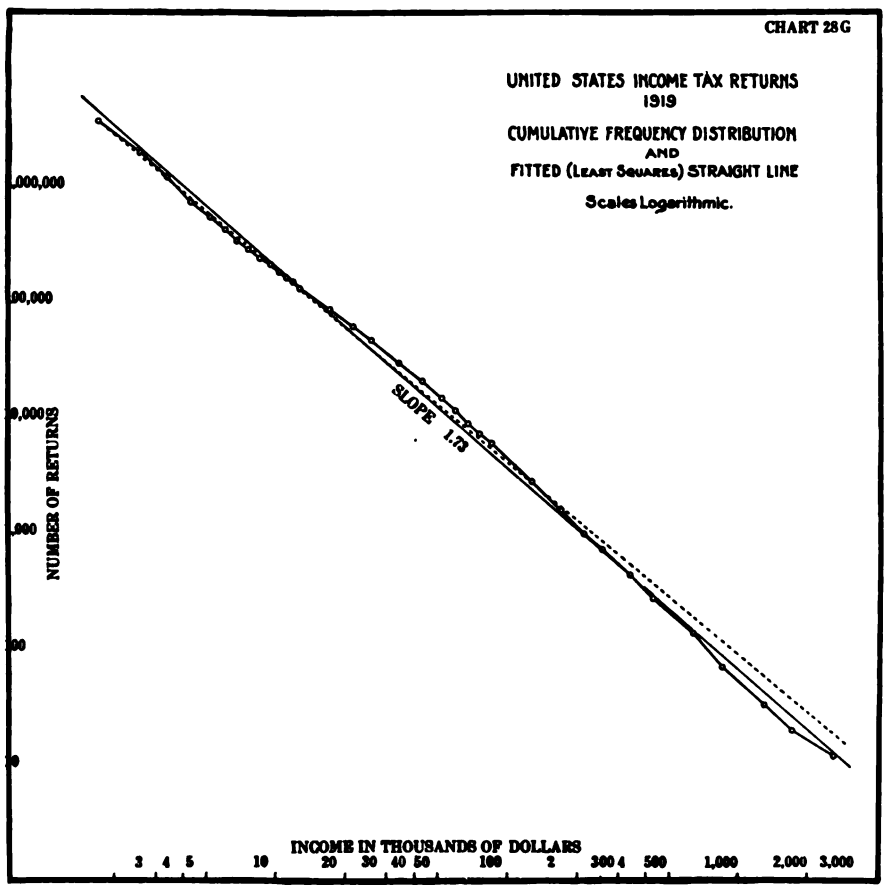


CHART 28G
UNITED STATES INCOME TAX RETURNS
1919
CUMULATIVE FREQUENCY DISTRIBUTION
AND
FITTED (LEAST SQUARES) STRAIGHT LINE
Scales Logarithmic.
SLOPE 1.73
NUMBER OF RETURNS
INCOME IN THOUSANDS OF DOLLARS
3 4 5 10 20 30 40 50 100 2 300 4 500 1,000 2,000 3,000

TABLE 28B

UNITED STATES INCOME-TAX RETURNS, 1914

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 3,000–$ 4,000	(82,754)				
4,000– 5,000	66,525	101,241	84,683	65.7	78.6
5,000– 10,000	127,448	160,545	115,347	79.4	110.5
10,000– 15,000	34,141	38,630	32,716	88.4	104.4
15,000– 20,000	15,790	15,853	14,102	99.6	112.0
20,000– 25,000	8,672	8,230	7,589	105.4	114.3
25,000– 30,000	5,483	4,879	4,631	112.4	118.4
30,000– 40,000	6,008	5,380	5,267	111.7	114.1
40,000– 50,000	3,185	2,793	2,835	114.0	112.3
50,000– 100,000	5,161	4,430	4,756	116.5	108.5
100,000– 150,000	1,189	1,065.5	1,241	111.6	95.8
150,000– 200,000	406	437.3	535	92.8	75.9
200,000– 250,000	233	227.1	288.1	102.6	80.9
250,000– 300,000	130	134.6	175.5	96.6	74.1
300,000– 400,000	147	148.46	199.9	99.0	73.5
400,000– 500,000	69	77.06	107.6	89.5	64.1
500,000–1,000,000	114	122.20	180.4	93.3	63.2
1,000,000 and over	60	62.78	107.5	95.6	55.8
Total (over $4,000)	274,761	344,256.00	274,761.0		

TABLE 28C

UNITED STATES INCOME-TAX RETURNS, 1915

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 3,000-$ 4,000	(69,045)				
4,000- 5,000	58,949	92,064	68,540	64.0	86.0
5,000- 10,000	120,402	154,507	119,634	77.9	100.6
10,000- 15,000	34,102	40,358	33,013	84.5	103.3
15,000- 20,000	16,475	17,406	14,724	94.7	111.9
20,000- 25,000	9,707	9,372	8,124	103.6	119.5
25,000- 30,000	6,196	5,716	5,050	108.4	122.7
30,000- 40,000	7,005	6,508	5,875	107.6	119.2
40,000- 50,000	4,100	3,503	3,241	117.0	126.5
50,000- 100,000	6,847	5,880	5,653	116.4	121.1
100,000- 150,000	1,793	1,536	1,560	116.7	114.9
150,000- 200,000	724	662.5	695.4	109.3	104.1
200,000- 250,000	386	356.6	383.8	108.2	100.6
250,000- 300,000	216	217.5	238.6	99.3	90.5
300,000- 400,000	254	247.7	277.6	102.5	91.5
400,000- 500,000	122	133.3	153.2	91.5	79.6
500,000-1,000,000	209	223.8	267.1	93.4	78.2
1,000,000 and over	120	133.6	177.3	89.8	67.7
Total (over $4,000)	267,607	338,825.0	267,607.0		

TABLE 28D

UNITED STATES INCOME-TAX RETURNS, 1916

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 3,000-$ 4,000	(85,122)				
4,000- 5,000	72,027	139,096	86,588	51.8	83.2
5,000- 6,000	52,029	84,759	54,221	61.4	96.0
6,000- 7,000	36,470	56,533	36,899	64.5	98.8
7,000- 8,000	26,444	39,846	26,516	66.4	99.7
8,000- 9,000	19,959	29,292	19,801	68.1	100.8
9,000- 10,000	15,651	22,529	15,445	69.5	101.3
10,000- 15,000	45,309	60,668	42,879	74.7	105.7
15,000- 20,000	22,618	26,120	19,311	86.6	117.1
20,000- 25,000	12,953	14,044	10,726	92.2	120.8
25,000- 30,000	8,055	8,558	6,705	94.1	120.1
30,000- 40,000	10,068	9,731	7,854	103.5	128.2
40,000- 50,000	5,611	5,232	4,362	107.2	128.6
50,000- 60,000	3,621	3,189	2,730	113.5	132.6
60,000- 70,000	2,548	2,126	1,857	119.8	137.2
70,000- 80,000	1,787	1,499	1,334.8	119.2	133.9
80,000- 90,000	1,422	1,102	996.8	129.0	142.7
90,000- 100,000	1,074	847	777.5	126.8	138.1
100,000- 150,000	2,900	2,282.1	2,158.4	127.1	134.4
150,000- 200,000	1,284	982.6	972.1	130.7	132.1
200,000- 250,000	726	528.2	539.9	137.4	134.5
250,000- 300,000	427	321.9	337.6	132.6	126.5
300,000- 400,000	469	366.1	395.3	128.1	118.6
400,000- 500,000	245	196.8	219.6	124.5	111.6
500,000-1,000,000	376	329.6	387.4	114.1	97.1
1,000,000-1,500,000	97	85.83	108.7	113.0	89.2
1,500,000-2,000,000	42	36.96	48.88	113.6	85.9
2,000,000-3,000,000	34	31.98	44.19	106.3	76.9
3,000,000-4,000,000	14	13.77	19.91	101.7	70.3
4,000,000-5,000,000	9	7.40	11.05	121.6	81.4
5,000,000 and over	10	19.76	32.87	50.6	30.4
Total (over $4,000)	344,279	510,374.00	344,279.00		

TABLE 28E

UNITED STATES INCOME-TAX RETURNS, 1917

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 1,000–$ 2,000	(1,640,758)				
2,000– 2,500	480,486	618,069	517,512	77.7	92.8
2,500– 3,000	358,221	367,835	284,620	97.4	125.9
3,000– 4,000	374,958	407,366	376,117	92.0	99.7
4,000– 5,000	185,805	212,569	184,854	87.4	100.5
5,000– 6,000	105,988	126,507	111,097	83.8	95.4
6,000– 7,000	64,010	82,746	73,355	77.4	87.3
7,000– 8,000	44,363	57,357	51,285	77.3	86.5
8,000– 9,000	31,769	41,556	37,362	76.4	85.0
9,000– 10,000	24,536	31,551	28,551	77.8	85.9
10,000– 11,000	19,221	24,097	21,900	79.8	87.8
11,000– 12,000	15,035	19,412	17,747	77.5	84.7
12,000– 13,000	12,328	15,707	14,440	78.5	85.4
13,000– 14,000	10,427	12,751	11,761	81.8	88.7
14,000– 15,000	8,789	10,709	9,909	82.1	88.7
15,000– 20,000	29,896	34,161	31,891	87.5	93.7
20,000– 25,000	16,806	17,825	16,876	94.3	99.6
25,000– 30,000	10,571	10,609	10,159	99.6	104.1
30,000– 40,000	12,733	11,749	11,385	108.4	111.8
40,000– 50,000	7,087	6,130	6,021	115.6	117.7
50,000– 60,000	4,541	3,649	3,622	124.4	125.4
60,000– 70,000	2,954	2,387	2,391	123.8	123.5
70,000– 80,000	2,222	1,653.5	1,672	134.4	132.9
80,000– 90,000	1,539	1,198.5	1,217.9	128.4	126.4
90,000– 100,000	1,183	910.0	930.8	130.0	127.1
100,000– 150,000	3,302	2,384.4	2,469.5	138.5	133.7
150,000– 200,000	1,302	985.2	1,039.6	132.2	125.2
200,000– 250,000	703	514.1	550.5	136.7	127.7
250,000– 300,000	342	305.9	330.8	111.8	103.4
300,000– 400,000	380	338.9	371.2	112.1	102.4
400,000– 500,000	179	176.8	196.3	101.2	91.2
500,000– 750,000	225	199.96	225.56	112.5	99.8
750,000–1,000,000	90	82.61	94.97	108.9	94.8
1,000,000–1,500,000	67	68.77	80.51	97.4	83.2
1,500,000–2,000,000	33	28.42	33.90	116.1	97.3
2,000,000–3,000,000	24	23.65	28.71	101.5	83.6
3,000,000–4,000,000	5	9.77	12.10	51.2	41.3
4,000,000–5,000,000	8	5.10	6.40	156.9	125.0
5,000,000 and over	4	12.42	16.25	32.2	24.6
Total (over $2,000)	1,832,132	2,123,640.00	1,832,132.00		

TABLE 28F

UNITED STATES INCOME-TAX RETURNS, 1918

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 1,000–$ 2,000	(1,516,938)				
2,000– 3,000	1,496,878	1,375,372	1,470,366	108.8	101.8
3,000– 4,000	610,095	537,892	566,044	113.4	107.8
4,000– 5,000	322,241	269,674	280,477	119.5	114.9
5,000– 6,000	126,554	155,513	160,366	81.4	78.9
6,000– 7,000	79,152	99,102	101,389	79.9	78.1
7,000– 8,000	51,381	67,184	68,258	76.5	75.3
8,000– 9,000	35,117	47,740	48,266	73.6	72.8
9,000– 10,000	27,152	35,628	35,795	76.2	75.9
10,000– 11,000	20,414	26,793	26,832	76.2	76.1
11,000– 12,000	16,371	21,283	21,231	76.9	77.1
12,000– 13,000	13,202	16,999	16,873	77.7	78.2
13,000– 14,000	10,882	13,638	13,515	79.8	80.5
14,000– 15,000	9,123	11,328	11,165	80.5	81.7
15,000– 20,000	30,227	35,214	34,486	85.8	87.7
20,000– 25,000	16,350	17,654	17,097	92.6	95.6
25,000– 30,000	10,206	10,181	9,762	100.2	104.5
30,000– 40,000	11,887	10,886	10,336	109.2	115.0
40,000– 50,000	6,449	5,458	5,121	118.2	125.9
50,000– 60,000	3,720	3,147	2,928	118.2	127.0
60,000– 70,000	2,441	2,006	1,852	121.7	131.8
70,000– 80,000	1,691	1,359.5	1,246	124.4	135.7
80,000– 90,000	1,210	966.2	881.4	125.2	137.3
90,000– 100,000	934	721.0	653.7	129.5	142.9
100,000– 150,000	2,358	1,822.3	1,636.3	129.4	144.1
150,000– 200,000	866	712.7	629.8	121.5	137.5
200,000– 250,000	401	357.3	312.1	112.2	128.5
250,000– 300,000	247	206.0	178.3	119.9	138.5
300,000– 400,000	260	220.3	188.7	118.0	137.8
400,000– 500,000	122	110.5	93.55	110.4	130.4
500,000– 750,000	132	119.28	99.70	110.7	132.4
750,000–1,000,000	46	46.66	38.36	98.6	119.9
1,000,000–1,500,000	33	36.88	29.88	89.5	110.4
1,500,000–2,000,000	16	14.42	11.50	111.0	139.1
2,000,000–3,000,000	11	11.40	8.96	96.5	122.8
3,000,000–4,000,000	4	4.46	3.44	89.7	116.3
4,000,000–5,000,000	2	2.24	1.71	89.3	117.0
5,000,000 and over	1	4.86	3.60	20.6	27.8
Total (over $2,000)	2,908,176	2,769,408.00	2,908,176.00		

TABLE 28G

UNITED STATES INCOME-TAX RETURNS, 1919

Income class	A U. S. income-tax returns	B Least-squares straight line	C Straight line giving correct total returns and income	Per cent A is of B	Per cent A is of C
$ 1,000–$ 2,000	(1,924,872)				
2,000– 3,000	1,569,741	1,984,285	1,673,688	79.1	93.8
3,000– 4,000	742,334	764,739	660,950	97.1	112.3
4,000– 5,000	438,154	379,330	333,645	115.5	131.3
5,000– 6,000	167,005	216,921	193,470	77.0	86.3
6,000– 7,000	109,674	137,278	123,953	79.9	88.5
7,000– 8,000	73,719	92,511	84,273	79.7	87.5
8,000– 9,000	50,486	65,403	60,066	77.2	84.1
9,000– 10,000	37,967	48,583	44,980	78.1	84.4
10,000– 11,000	28,499	36,386	33,887	78.3	84.1
11,000– 12,000	22,841	28,796	27,027	79.3	84.5
12,000– 13,000	18,423	22,921	21,600	80.4	85.3
13,000– 14,000	15,248	18,329	17,395	83.2	87.7
14,000– 15,000	12,841	15,181	14,459	84.6	88.8
15,000– 20,000	42,028	46,868	45,162	89.7	93.1
20,000– 25,000	22,605	23,249	22,797	97.2	99.2
25,000– 30,000	13,769	13,294	13,228	103.6	104.1
30,000– 40,000	15,410	14,084	14,219	109.4	108.4
40,000– 50,000	8,298	6,986	7,178	118.8	115.6
50,000– 60,000	5,213	3,994	4,162	130.5	125.3
60,000– 70,000	3,196	2,528	2,665	126.4	119.9
70,000– 80,000	2,237	1,704	1,813	131.3	123.4
80,000– 90,000	1,561	1,205	1,292	129.5	120.8
90,000– 100,000	1,113	894	968.3	124.5	114.9
100,000– 150,000	2,983	2,240	2,461.5	133.2	121.2
150,000– 200,000	1,092	863.2	971.6	126.5	112.4
200,000– 250,000	522	428.1	490.4	121.9	106.4
250,000– 300,000	250	245.0	284.4	102.0	87.9
300,000– 400,000	285	259.2	306.0	110.0	93.1
400,000– 500,000	140	128.6	154.4	108.9	90.7
500,000– 750,000	129	137.32	168.2	93.9	76.7
750,000–1,000,000	60	52.89	66.4	113.4	90.4
1,000,000–1,500,000	34	41.25	52.95	82.4	64.2
1,500,000–2,000,000	13	15.89	20.90	81.8	62.2
2,000,000–3,000,000	7	12.40	16.68	56.5	42.0
3,000,000 and over	11	12.15	17.27	90.5	63.7
Total (over $2,000)	3,407,888	3,929,905.00	3,407,888.00		

Why do the least-squares straight lines appear graphically such good fits to the cumulative distributions (for at least the later years) when a merely arithmetic analysis shows even this fit to the cumulative data to be so illusory? *Because the percentage range in the number of persons is so extremely wide.* The deviations of the cumulative data on a double log scale from the least-squares straight line are minute *when compared with the percentage changes in the data from the smallest to the largest incomes.* But this is not helpful. The fact that there are 100,000 times as many persons having incomes over $2,000 per annum as there are persons having incomes over $5,000,000 per annum, does not make a theoretical reading for a particular income interval of twenty or thirty per cent over or under the data reading an unimportant deviation. Charting data on a double log scale may thus become a fertile source of error unless accompanied by careful interpretation.[1] This fact has long been recognized by engineers and others who have had much experience with similar problems in curve fitting.

Another matter of some importance must be noted here. The deviations of the data from the straight lines might be much less than they are and yet constitute extremely bad fits. *The data points (even on a non-cumulative basis) do not flutter erratically from side to side of the fitted lines; they run smoothly, passing through the fitted line at small angles in the way that one curve cuts another.* Now, in curve fitting, such a condition always strongly suggests that the particular mathematical curve used is not in any sense the "law" of the data.

2. Are the slopes of the straight lines fitted to income data from different times and places similar in any significant degree?

[1] The dangers of fitting curves with such a combination as a cumulative distribution and a double log scale, without further analysis, is well illustrated by the results Professor Pareto obtained for Oldenburg. To the Oldenburg data he fitted the rather complicated equation $\log N = \log A - \alpha \log (x + a) - \beta x$ and obtained the following results. (The value Pareto gives for β, namely .0000631, does not check with his calculated figures given below. β = .0000274 is evidently what he intended.)

Income in marks (over)	N	Logarithms of N		Δ
		Observed	Calculated	
300	54,309	4.7349	4.7349	
600	24,043	4.3810	4.4368	—.0558
900	16,660	4.2217	4.2304	—.0086
1,500	9,631	3.9837	3.9409	+.0428
3,000	3,502	3.5443	3.5008	+.0435
6,000	994	2.9974	2.9997	—.0023
9,000	445	2.6484	2.6671	—.0187
15,300	140	2.1461	2.1838	—.0377
30,000	25	1.3979	1.3364	+.0615

(From *Cours d'Economie Politique*, vol. II, p. 307.)

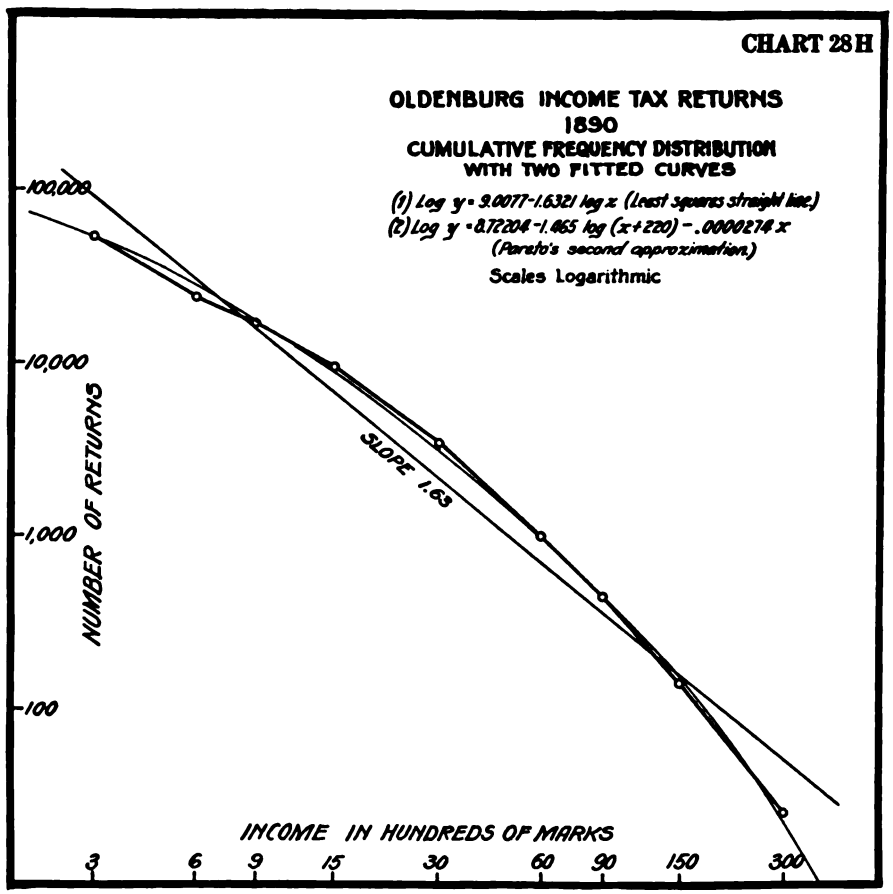
The above table may give the reader a vague idea that the fit is rather good. However, from the above table the following table may be directly derived:

(Note concluded page 364.)

If income distributions charted on a double log scale not only cannot be approximately represented by straight lines, but also differ radically
(Note 1 page 363 concluded.)

Income in marks	Number of persons		Per cent actual are of computed
	Actual	Computed	
300– 600	30,266	26,969	112.2
600– 900	7,383	10,342	71.4
900– 1,500	7,029	8,270	85.0
1,500– 3,000	6,129	5,560	110.2
3,000– 6,000	2,508	2,169	115.6
6,000– 9,000	549	534	102.8
9,000–15,300	305	312	97.8
15,300–30,000	115	131	87.8
Over 30,000	25	22	113.6
Total	54,309	54,309	100.0

The fit no longer impresses one as quite so good. See Chart 28H below.



in shape, it is of course not of great importance whether the straight lines fitted to such data from different times and places have or have not approximately constant slopes. For example, a comparison of Chart 28C showing the cumulative distribution of United States income-tax returns for 1915 on a double log scale and Chart 28F showing similar data for 1918, makes it plain that, even were the slopes of the fitted straight lines for the two years identical, the data curves would still be so different as to make the similarity of slope of the fitted lines of almost no significance.[1]

In considering slopes, let us examine further both the data and the fitted lines for these two years 1915 and 1918. Tables 28I and 28J give some numerical illustrations of the differences between the distributions for the two years. Table 28I gives the number of returns in each income interval each year and the percentages that the 1918 figures are of the 1915 figures.

TABLE 28I

COMPARISON OF UNITED STATES INCOME-TAX RETURNS FOR 1915 AND 1918

Income class	Number of returns		Ratio of 1918 to 1915
	1915	1918	
$ 4,000 [a]–$ 5,000	58,949	322,241	5.4664
5,000– 10,000	120,402	319,356	2.6524
10,000– 15,000	34,102	69,992	2.0524
15,000– 20,000	16,475	30,227	1.8347
20,000– 25,000	9,707	16,350	1.6844
25,000– 30,000	6,196	10,206	1.6472
30,000– 40,000	7,005	11,887	1.6969
40,000– 50,000	4,100	6,449	1.5729
50,000– 100,000	6,847	9,996	1.4599
100,000– 150,000	1,793	2,358	1.3151
150,000– 200,000	724	866	1.1961
200,000– 250,000	386	401	1.0389
250,000– 300,000	216	247	1.1435
300,000– 400,000	254	260	1.0236
400,000– 500,000	122	122	1.0000
500,000–1,000,000	209	178	.8517
1,000,000 and over	120	67	.5583

[a] The $3,000–$4,000 class is not included, as in 1915 married persons in that class were exempted while in 1918 they were not.

The change as we pass from the $4,000–$5,000 interval, where the 1918 figures are nearly five-and-a-half times the 1915 figures, to the intervals above $500,000, where the 1918 figures are actually less than the 1915 figures, illustrates the great and fundamental difference between the slopes of the two distributions. However, such a comparison of unadjusted

[1] Compare also the deviations from the fitted lines as given in Tables 28C and 28F.

money intervals, while it throws into relief the differences in slope of the two distributions, is by no means as enlightening for purposes of exhibiting their other essential dissimilarities as a comparison of the two sets of data after they have been adjusted for changes in average (per capita) income and changes in population. Table 28J gives some comparisons between the data for the two years and between the fitted lines for the two years on such an adjusted basis. Two intervals, one in the relatively low income range and the other in the high income range, are used to illustrate the essentially different character of the distributions for the two years.

TABLE 28J

COMPARISONS OF UNITED STATES INCOME-TAX RETURNS FOR THE YEARS 1915 AND 1918 ADJUSTED FOR CHANGES IN AVERAGE (PER CAPITA) INCOME AND CHANGES IN POPULATION

ACTUAL INCOME-TAX DATA

Income intervals	Number of returns (1)	(2)	Fraction of population (3)	(4)	Ratio of Column (4) to Column (3)
	1915	1918	1915	1918	
Between 12 and 13 times average income	21,190	31,197	.00021099	.00029945	1.4193
Between 1,200 and 1,300 times average income	43.85	20.37	.0000004366	.0000001955	.4478
Over 12 times average income	248,600	271,452	.00247536	.00260561	1.0526
	Amount in dollars		Per cent of total income		
	1915	1918	1915	1918	
Over 12 times average income	$4,283,010,735	$5,312,832,516	11.9%	8.7%	.7311

LEAST-SQUARES STRAIGHT LINES

Income intervals	Number of returns (1)	(2)	Fraction of population (3)	(4)	Ratio of Column (4) to Column (3)
	1915	1918	1915	1918	
Between 12 and 13 times average income	32,886	41,730	.00032745	.00040056	1.2233
Between 1,200 and 1,300 times average income	47.63	17.10	.0000004743	.0000001641	.3460

STRAIGHT LINES FITTED TO GIVE THE SAME TOTAL NUMBER OF RETURNS AND THE SAME TOTAL INCOME AS THE INCOME-TAX DATA

Income intervals	Number of returns (1)	(2)	Fraction of population (3)	(4)	Ratio of Column (4) to Column (3)
	1915	1918	1915	1918	
Between 12 and 13 times average income	24,510	42,460	.00024405	.00040756	1.6700
Between 1,200 and 1,300 times average income	54.73	14.15	.0000005450	.0000001358	.2492

NOTES TO TABLE 28J
"Average Income" Intervals

	1915	1918
Average income	$ 358	$ 586
12 times average income	4,296	7,032
13 " " "	4,654	7,618
1.200 " " "	429,600	703,200
1.300 " " "	465,400	761,800

Equations of Fitted Straight Lines on a Cumulative Double Log Basis

	Least-squares lines	Lines giving correct total number of returns and total income
1914	$y = 11.153322 - 1.559256\,x$	$y = 10.557242 - 1.420936\,x$
1915	$y = 10.643299 - 1.419579\,x$	$y = 10.202382 - 1.325598\,x$
1916	$y = 10.839435 - 1.424638\,x$	$y = 10.212702 - 1.298088\,x$
1917	$y = 11.410606 - 1.539996\,x$	$y = 11.170980 - 1.486817\,x$
1918	$y = 12.033697 - 1.693823\,x$	$y = 12.202452 - 1.738497\,x$
1919	$y = 12.320963 - 1.734802\,x$	$y = 12.036155 - 1.667258\,x$

Table 28J needs little discussion. In the section treating actual income-tax data we notice that while the adjusted number of returns in the lower income interval [1] *increased* 41.93 per cent from 1915 to 1918, the adjusted number of returns in the upper income interval [2] *decreased* 55.22 per cent. Moreover, while the adjusted total *number* of returns above the "12-times-average-income" point increased 5.26 per cent, the adjusted *amount of income* reported in these returns decreased 26.89 per cent.

Such figures suggest a rather radical change in the distribution of income during this short three-year period. Similar conclusions may be drawn from the figures for the two pairs of fitted lines, though we must of course remember that these lines describe only very inadequately the actual data. The lines so fitted as to give each year the same total number of returns and total amount of income as the data for that year yield sensational results. While the adjusted number of returns in the lower income-interval *increased* 67 per cent, the adjusted number of returns in the upper income-interval *decreased* 75.08 per cent.

Finally, it has been suggested that changes in the characteristics of the tax-income-distribution in the United States from 1915 to 1918 may be accounted for as the results of the increase in the surtax rates with 1917. We do not believe any large part of these changes can be so accounted for. Notwithstanding the fact that the country entered the European war during the interval, the difference between the 1915 distribution and the 1918 distribution in the United States, extreme as it is, cannot be said to be unreasonably or unbelievably great. Even the changes in the slope of the least-squares line are not phenomenal. Pareto's Prussian figures contain fluctuations in slope from —1.60 to —1.89 while the slope of the least-squares straight line fitted to his Basle data is only —1.25. The

[1] Between 12 and 13 times the average income (per capita) each year.

[2] Between 1,200 and 1,300 times the average income (per capita) each year.

slopes of the least-squares straight lines fitted to the American data are —1.42 for 1915 and —1.69 for 1918.

> 3. If the upper income ranges (or "tails") of income distributions were, when charted on a double log scale, closely similar in shape, would that fact justify the assumption that the lower income ranges were likewise closely similar?

Before attempting to answer the above question, let us summarize the case we have just made against believing the "tails" significantly similar. We can then discuss how much importance such similarity would have did it exist.

We have found upon examination that the approximation to straight lines of the tails of income distributions plotted on double log scales is specious; that the slopes of the fitted straight lines differ sufficiently to produce extreme variations in the relative number of income recipients in the upper as compared with the lower income ranges of the tails; that the upper and lower income ranges of the actual data for different times or places tell a similar story of extreme variation; and that the irregularities in shape of the tails of the actual data, entirely aside from any question of approximating or not approximating straight lines of constant slope, vary greatly from year to year and from country to country, ranging all the way from the irregularities of such distributions as the Oldenburg data, through the American data for 1914, 1915 and 1916 to such an entirely different set of irregularities as those seen in the American data for 1918[1].

At this stage of the discussion the reader may ask whether a general appearance of approximating straight lines on a double log scale, poor as the actual fit may be found to be under analysis, has not some meaning, some significance. The answer to this question must be that, if we were not dealing with a frequency distribution but with a correlation table showing a relationship between *two variables*, an approximation of the regression lines to linearity when charted on a double log scale might easily be the clue to a first approximation to a rational law; but that, on the other hand, approximate linearity in the *tail of a frequency distribution* charted on a double log scale signifies relatively little because it is such a common characteristic of frequency distributions of many and varied types.

The straight line on a double log scale or, in other words, the equation $y = bx^m$, when used to express a relationship between two variables, is, to quote a well-known text on engineering mathematics, "one of the most useful classes of curves in engineering." [2] In deciding what type of equation to use in fitting curves by the method of least squares to data con-

[1] Compare Charts 28H, 28B, 28C, 28D and 28F.
[2] P. Steinmetz, *Engineering Mathematics*, p. 216.

cerning two variables the texts usually mention $y = bx^m$ as "a quite common case." [1] A recent author writes, "simple curves which approximate a large number of empirical data are the parabolic and hyperbolic curves. The equation of such a curve is $y = ax^b$ [$y = bx^m$], parabolic for b positive and hyperbolic for b negative." [2] A widely used text on elementary mathematics speaks of the equation $y = bx^m$ as one of "the three fundamental functions" in practical mathematics.[3] The market for "logarithmic paper" shows what a large number of two-variable relationships may be approximated by this equation. Moreover this equation is often a close first approximation to a rational law. Witness "Boyle's Law." Indeed, sufficient use has not been made of this curve in economic discussions of two-variable problems.

The primary reason why approximation to linearity on a double log scale has no such significance in the case of the *tail of a frequency distribution* as it often has in the case of a two-variable problem is because of the very fact that we are considering the *tail* of the distribution, in other words, a mere fraction of the data. While frequency distributions which can be described throughout their length by a curve of the type $y = bx^m$ are extremely rare, a large percentage of all frequency distributions have *tails* approximating straight lines on a double log scale.[4] It is astonishing how many homogeneous frequency distributions of all kinds may be described with a fair degree of adequacy by means of hyperbolas [5] fitted to the data on a double log scale. Along with this characteristic goes, of course, the possibility of fitting to the tails of such distributions straight lines approximately parallel to the asymptotes of the fitted hyperbola. However we have by no means adequately described an hyperbola when we have stated the fact that one of its asymptotes is (of course) a straight line and that its slope is such and such. Had we even similar information concerning the other asymptote also, we should know little about the hyperbola or the frequency distribution which it would describe on a double log scale. The hyperbola might coincide with its asymptotes and hence have an *angle* at the mode or it might have a very much rounded "top." Such a variation in the shape of the top of the hyperbola [6] would generally correspond to a very great variation in the scatter or "inequality" of the distribution as well as many other characteristics.

[1] D. P. Bartlett, *Method of Least Squares*, p. 33.
[2] J. Lipka, *Graphical and Mechanical Computation*, p. 128.
[3] C. S. Slichter, *Elementary Mathematical Analysis*, preface.
[4] A very large percentage of the remainder have tails approximating straight lines on a natural x log y basis.
[5] N. B. Not a *straight line on the double log scale*, which is a so-called hyperbola on the natural scale, but a true conic section *hyperbola on the double log scale*.
Charts 28K and 28L (Earnings per Hour of 318,946 Male Employees in 1919) illustrate how excellent a fit may often be obtained by means of an hyperbola even though fitted only by selected points. A comparison of the least-squares parabola and the selected-points hyperbola on Chart 28K illustrates also the straight-tail effect.
[6] Compare Karl Pearson's concept of "kurtosis."

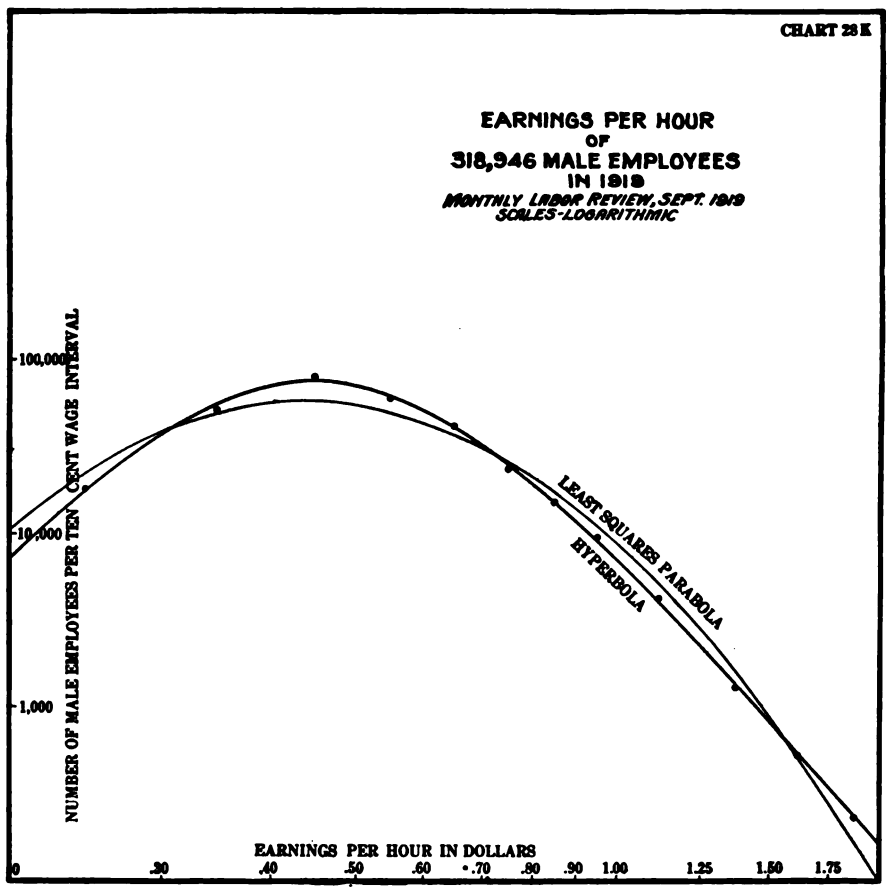
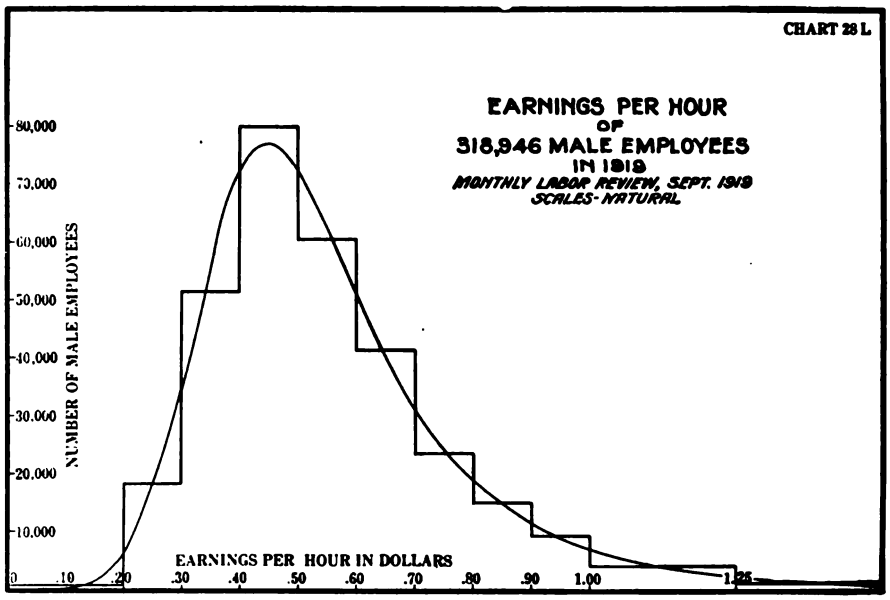
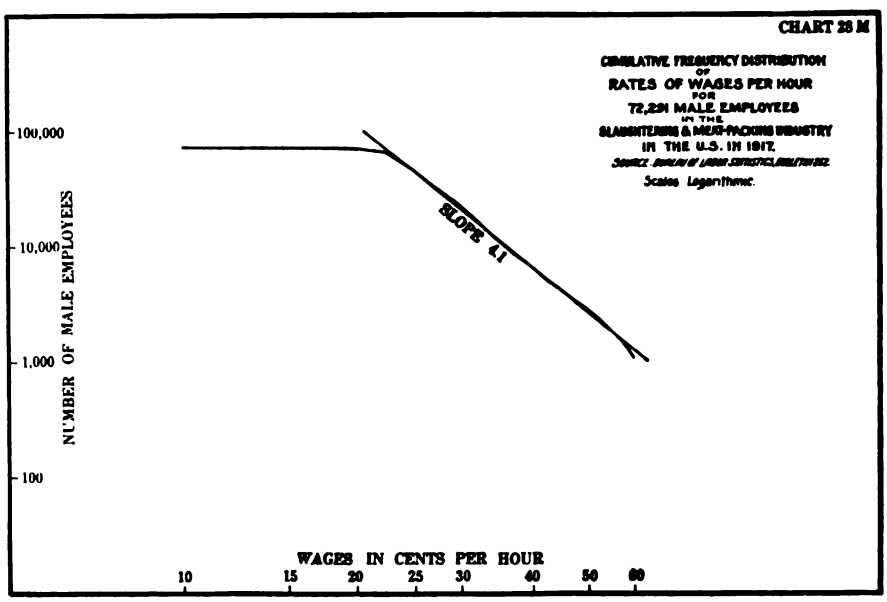
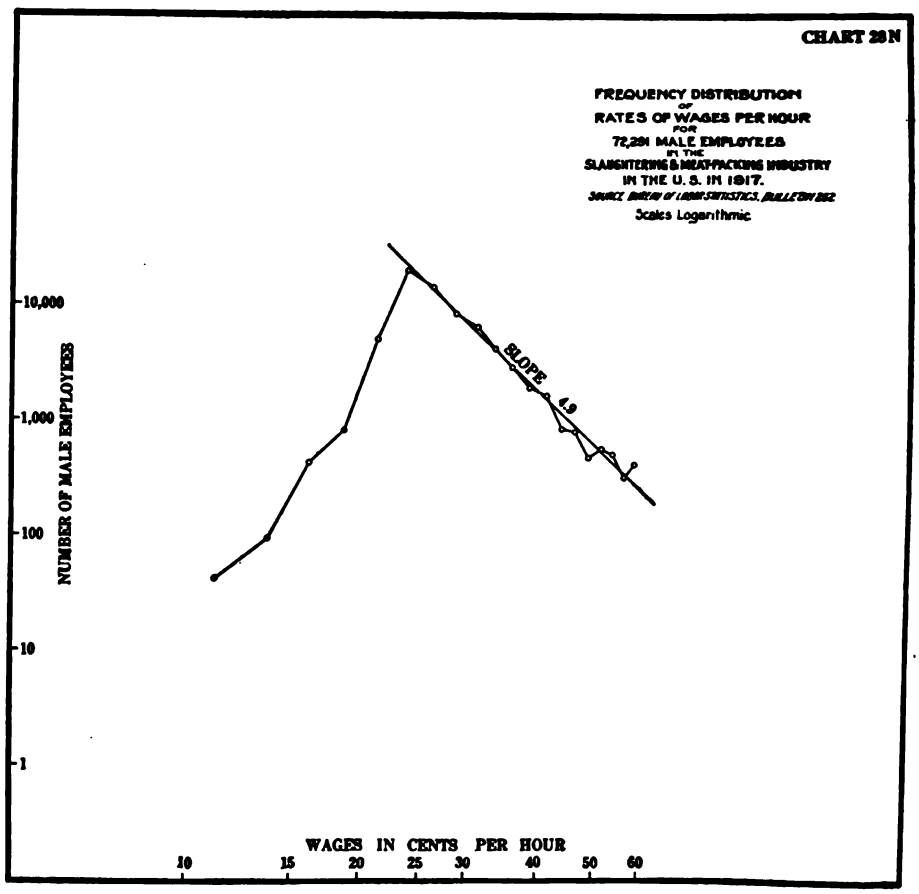


CHART 28 K
EARNINGS PER HOUR
OF
318,946 MALE EMPLOYEES
IN 1918
MONTHLY LABOR REVIEW, SEPT. 1919
SCALES-LOGARITHMIC
NUMBER OF MALE EMPLOYEES PER TEN CENT WAGE INTERVAL
100,000
10,000
1,000
LEAST SQUARES PARABOLA
HYPERBOLA
EARNINGS PER HOUR IN DOLLARS
0
.30
.40
.50
.60
.70
.80
.90
1.00
1.25
1.50
1.75



Rough similarity in the *tails* of two distributions on a double log scale by no means proves even rough similarity in the remainder of the distributions. Charts 28M, 28N, 28O and 28P illustrate both cumulatively



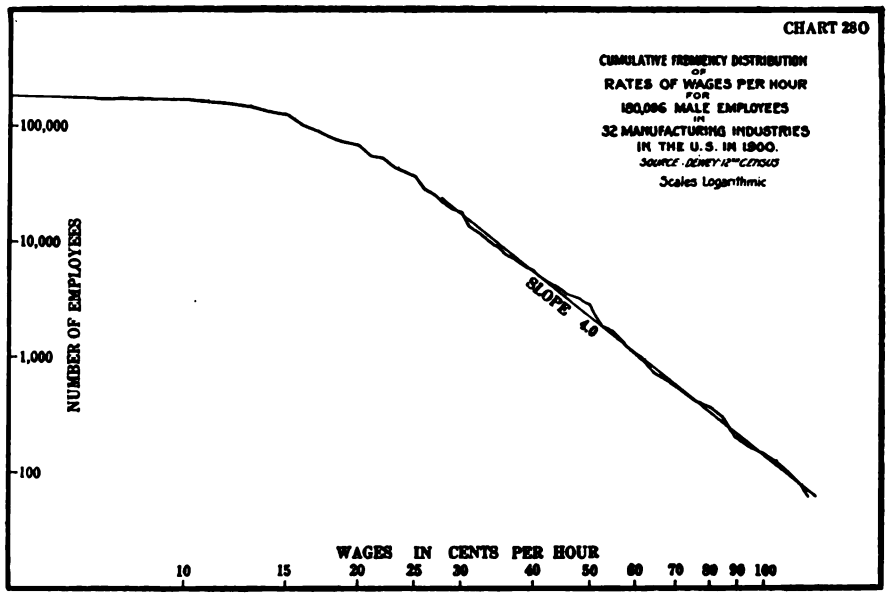


and non-cumulatively on a double log scale two wages distributions whose extreme tails appear roughly to approximate straight lines of about equal slope.[1] Charts 28M and 28N are from data concerning wages per hour of 72,291 male employees in the slaughtering and meat-packing industry in 1917;[2] Charts 28O and 28P are from data concerning wages per hour of 180,096 male employees in 32 manufacturing industries in the United States in 1900.[3] A mere glance at the two non-cumulative distributions will bring home the fact that while they show considerable similarity in the upper income range tails, they are quite dissimilar in the remainder

[1] The illustration shows only "rough similarity" in the extreme tails. However, there seems no good reason for believing that even great similarity in the tails proves similarity in the rest of the distribution. It certainly cannot do so in the case of essentially heterogeneous distributions, such as income distributions.

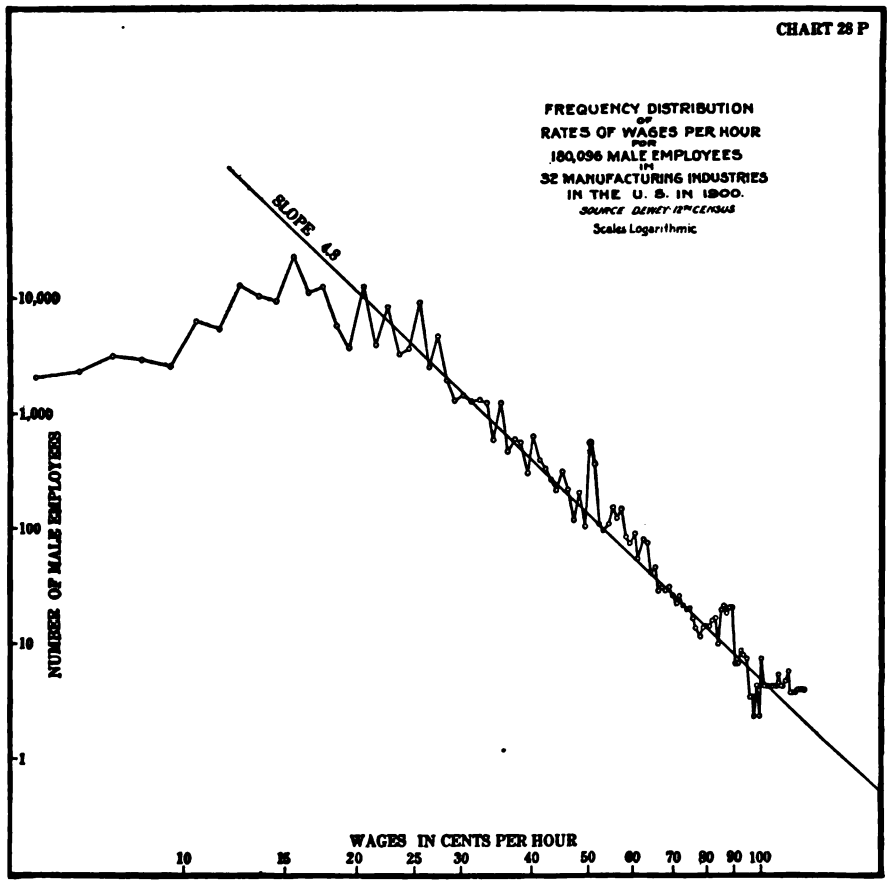
[2] Bureau of Labor Statistics, *Bulletin* No. 252.

[3] Twelfth Census of the United States (1900), *Special Report on Employees* and ——— Davis R. Dewey.



of the curves. Moreover, in spite of this similarity of tails, the slaughtering and meat-packing distribution has a coefficient of variation of 30.5 while the manufacturing distribution has a coefficient of 47.7. In other words, the relative scatter or "inequality of distribution" is more than one-and-a-half times as great in the manufacturing data as it is in the slaughtering and meat-packing data. Furthermore, no discussion and explanation of greater essential heterogeneity in the one distribution than in the other will offset the fact that the tails are similar but the distributions are different. There seems indeed to be almost no correlation between the slope of the upper-range tail and the degree of scatter in wages distributions. Some distributions showing extremely great scatter have very steep tails, some have not.[1] The frequency curve for the distribution of income in Australia in 1915 is radically different from either the curve for the United States in 1910 constructed by Mr. W. I. King or the curve for the United States in 1918 constructed by the National Bureau of Economic Research.

[1] The tails of wage distributions have in general much greater slopes than those of the upper (i. e., income-tax) range of income distributions. This is an outstanding difference between the two distributions. Pareto's conclusions with respect to the convex appearance of the curve for wages are consistent with curves showing *number of dollars* per income-tax interval traceable to wages but not with actual wage distributions showing *number of recipients* per wage interval. Distributions based upon income from effort and distributions based upon income from such sources (mostly profits and income from property) as yield the higher incomes seem to have tails the one as roughly straight as the other. Indeed many wage distributions have tails more closely approximating straight lines than do income-tax data.



Yet all three curves have tails on a double log scale quite as similar as is common with income-tax returns.[1]

From this discussion we may draw the corollary that it is futile to attempt to measure changes in the inequality of distribution of income throughout its range by any function of the mere tail of the income frequency distribution. It seems unnecessary therefore to discuss Pareto's suggestions on this subject.

4. Is it probable that the distribution of income is similar enough from year to year in the same country to make the formulation of any useful general "law" possible?

[1] As will be seen in Chapter 29, there seems reason for believing that the extreme difference between the distribution of incomes obtained by the Australian Census and the estimate made by the National Bureau of Economic Research is due largely to difference in definition of *income* and *income recipient*. However, this does not alter the fact that we have here again two distributions with tails as similar as is usual with income-tax distributions and lower ranges about as different as it is possible to imagine.

Before answering this question we must decide what we should mean by the word *similar*. If income distributions for two years in the same country were such that each distribution included the same individuals and each individual's *income* was twice as large in the second year as it had been in the first year, it would seem reasonable to speak of the distributions as strictly similar. If in a third year (because of a doubling of population due to some hypothetical immigration) the *number* of persons receiving each specified income size was exactly twice what it was in the second year, it would still seem reasonable to speak of the distributions as strictly similar. Tested by any statistical criterion of dispersion which takes account of relative size (such as the coefficient of variation), the dispersion is precisely the same in each of the three years. Moreover the three distributions mentioned above [1] must necessarily have identically the same shape on a double log scale, and furthermore any two distributions which have identically the same shape on a double log scale [2] must necessarily have the same relative dispersion as measured by such indices as the coefficient of variation, interquartile range divided by median, etc. Approximation to identity of shape on a double log scale seems then a useful concept of "similarity." It is the concept implicit in Pareto's work.[3]

Now we have already found considerable evidence that income distributions are not, to a significant degree, similar in shape on a double log scale. The income-tax tails of income distributions for different times and places neither approximate straight lines of constant slope nor approximate one another; they are of distinctly different shapes. Moreover, such tails do not show in respect of their numbers of income recipients and

[1] Or, any distributions whose equations may be reduced to one another by substituting k_1x for x and k_2y for y.

[2] The curve may be thought of as consisting of two parts, which before reduction to logarithms, would be (1) the positive income section and (2) the negative income section with positive signs.

[3] While approximate identity of shape on a natural scale, a natural x and log y scale, or any other similar criterion would constitute a "law," no such approximate identity of shape on such scales has yet been discovered and it seems difficult to advance any very cogent *a priori* reasons for expecting it.

In this connection we must remember that had we the exact figures for the entire frequency curves of the distribution of income in the United States from year to year, if moreover we could imagine definitions of *income* and *income recipient* which would be philosophically satisfactory and statistically usable—and if further we managed year by year to describe our data curves adequately by generalized mathematical frequency curves of more or less complicated variety we should not *necessarily* have arrived at any particularly valuable results. Any series of data may be described to any specified degree of approximation by a power series of the type $y = A + Bx + Cx^2 + Dx^3 + \ldots\ldots$ but such fit is purely empirical and absolutely meaningless except as an illustration of MacLaurin's theorem in the differential calculus. We might be able to describe each year's data rather well by one of Karl Pearson's generalized frequency curves, but if the essential characteristics of the curve—skewness, kurtosis, etc., changed radically from year to year, description of the data by such a curve might well give no clue whatever as to any "law." Not only might the years be different but the fits might be empirical. Professor Edgeworth has well said that "a close fit of a curve to given statistics is not, *per se* and apart from *a priori* reasons, a proof that the curve in question is *the* form proper to the matter in hand. The curve may be adapted to the phenomena merely as the empirically justified system of cycles and epicycles to the planetary movements, not like the ellipse, in favor of which there is the Newtonian demonstration, as well as the Keplerian observations." *Journal of the Royal Statistical Society*, vol. 59, p. 533.

total amounts of income any uniformity of relation to the total number of income recipients and total amount of income in the country, even after adjustments have been made for variations in population and average income.[1] Considerations such as these, reënforce the conclusion which we arrived at from an examination of wage distributions, namely, that there is little necessary relation between the shape of the tail and the shape of the body of a frequency distribution, and have led us to suspect that, even if the tails of income distributions were practically identical in shape, it would be extremely dangerous to conclude therefore that the lower income ranges of the curves were in any way similar.

A most important matter remains to be discussed. What right have we to assume that the heterogeneity necessarily inherent in all income distribution data is not such as inevitably to preclude not only uniformity of shape of the frequency curve from year to year and country to country but also the very possibility of rational mathematical description of any kind unless based upon *parts* rather than the *whole*? What evidence have we as to the extent and nature of heterogeneity in income distribution data?

In the first place we must remember that lower range incomes are predominantly from wages and salaries, while upper range incomes are predominantly from rent, interest, dividends and profits.[2] While 74.67 per cent of the total income reported in the United States in the $1,000–$2,000 income interval in 1918 was traceable to *wages* and *salaries*, only 33.10 per cent of the income in the $10,000–$20,000 interval was from those sources, and only 15.92 per cent of the income in the $100,000–$150,000 interval and 3.27 per cent of the income in the over-$500,000 intervals. On the other hand, while only 1.93 per cent of the total income reported in the $1,000–$2,000 interval in 1918 was traceable to *dividends*, 23.73 per cent was so traceable in the $10,000–$20,000 interval, 43.18 per cent in the $100,000–$150,000 interval, and 59.44 per cent in the over-$500,000 intervals.[3] The difference in constitution of the income at the upper and

[1] Estimated per cent of total income received by highest 5% of income receivers in United States:

1913	33
1914	32
1915	32
1916	34
1917	29
1918	26
1919	24

National Bureau of Economic Research, *Income in the United States*, vol. 1, p. 116.

[2] Compare Professor A. L. Bowley's paper on "The British Super-Tax and the Distribution of Income," *Quarterly Journal of Economics*, February, 1914.

[3] *Statistics of Income 1918*, pp. 10 and 44.

While the reporting of dividends was almost certainly less complete in the lower than in the upper income classes, the difference could not be sufficient to invalidate the general conclusion. Lower range incomes are predominantly wage and salary incomes; upper range incomes are not.

lower ends of the distribution is sufficient to justify the statement that most of the individuals going to make up the lower income range of the frequency curve are wage earners, while the individuals going to make up the upper income range are capitalists and entrepreneurs.[1] What do we know about the shapes of these component distributions? Is the fundamental difference in their relative positions on the income scale their only dissimilarity?

In any particular year the upper income tail of the frequency distribution of income among *capitalists and entrepreneurs* seems not greatly different from the extreme upper income tail of the frequency distribution of income among all classes. This is what we might expect. Not only is the percentage of the total income in the extreme upper income ranges reported as coming from wages and salaries small but much of this so-called wages and salaries income must be merely technical. For example, it is often highly "convenient" to pay "salary" rather than dividends. Furthermore, in so far as the tail of the curve of distribution of income among capitalists and entrepreneurs is not identical with the tail of the general curve, it will show a *smaller* rather than a larger slope, because the percentage of the number of persons in each income interval who are capitalists and entrepreneurs increases as we pass from lower to higher incomes.[2] Now the slopes of the straight lines fitted to the extreme tails of non-cumulative income distributions on a double log scale fluctuate within a range of about 2.4 to 3.0.

The upper range tails of *wages* distributions tell an entirely different story. Aside from surface irregularities often quite evidently traceable to concentration on certain round numbers, the majority of wages distributions have tails which, on a double log scale, are roughly linear.[3] However the *slopes* of straight lines fitted to these tails are much greater than the slopes of corresponding straight lines fitted to income distribution tails.[4] While the slopes of income distribution tails range from about 2.4

[1] Many individuals in the middle income ranges must necessarily be difficult to classify. This does not mean that the concept of heterogeneity is inapplicable. There are countries in which the population is a mixture of Spanish, American Indian, and Negro blood. Now such a population must, for many statistical purposes, be considered extremely heterogeneous even though the percentage of the population which is of *any* pure blood be quite negligible.

[2] In 1917, the only year in which returns are classified according to "principal source of income" (wages and salaries, income from business, income from investment) the difference in slope, in the income range $100,000 to $2,000,000, between the distribution for *all returns* and the distribution for those returns which did not report wages and salaries as their principal source of income was less than .05. The slope in this range of the line fitted to all returns was about 2.64; the business and investment line was about 2.59 and the wages line about 3.21. In 1916, the only year in which returns are classified according to occupations, the distribution of income among *capitalists* shows a slope of only 2.08 while *public service employees (civil)* show a slope of 2.70 and *skilled and unskilled laborers* a slope of 2.74.

[3] Attention has already been drawn to the fact that this is a characteristic of many frequency distributions of various kinds.

[4] A further difference between the upper range income distribution among capitalists and entrepreneurs and the upper range of the distribution among all persons seems to be, from the 1916 occupation distributions, that the distribution among all persons shows less of a roll, i. e., is straighter.

to 3.0, the slopes of wages distributions tails commonly range between 4.0 and 6.0. They seldom run below about 4.5; they sometimes run as high as 10.0 and 11.0.

A distribution of wages per hour for 26,183 male employees in iron and steel mills in the United States in 1900 [1] shows a tail with a slope of about 3.35. However, the total of which this is a part, the distribution of wages per hour among 180,096 male employees in 32 manufacturing industries in 1900, shows a tail-slope of about 4.8. The estimated distribution of weekly earnings of 5,470,321 wage earners in the United States in 1905 [2] shows a tail-slope of about 5.0. The distribution of earnings per hour among 318,946 male employees in 29 different industries in the United States in 1919 [3] shows a tail-slope of about 5.86. The distribution of wages per month among 1,939,399 railroad employees in the United States in 1917 [4] shows a tail-slope of about 6.25. The distribution of wages per hour among 43,343 male employees in the foundries and metal working industry of the United States in 1900 [5] shows a tail-slope of about 7.8. The distribution of earnings in a week among 9,633 male employees in the woodworking industry—agricultural implements—in the United States in 1900[6] shows a tail-slope of over 11.0. At the other extreme was the case of the wages-per-hour distribution among 26,183 male employees in American iron and steel mills in 1900 with a slope of 3.35. Both 11.0 and 3.35 are exceptional, but the available data make it clear that wages distributions of either earnings or rates have tail-slopes which are always much greater than the maximum tail-slope of income distributions.

The illustrations in the preceding paragraph are illustrations of the tail-slopes of *wages* distributions among wage earners. However all the evidence points to frequency distributions of *income* among wage earners having tail-slopes only very slightly less steep than the tail-slopes of wages distributions. We have almost no usable data concerning the relation between individual wage distributions and income distributions for the same individuals, but we have a few samples showing the relation between family earnings distributions and family income distributions.[7] Moreover, we can without great risk base certain extremely general conclusions

[1] Twelfth Census of the United States (1900), *Special Report on Employees and Wages*, Davis R. Dewey.
[2] *1905 Census of Manufacturers*, Part IV, p. 647.
[3] *Monthly Labor Review*, Sept., 1919.
[4] *Report of the Railroad Wage Commission to the Director General of Railroads*, 1919, p. 96.
[5] Twelfth Census of the United States (1900), *Special Report on Employees and Wages*, Davis R. Dewey.
[6] Twelfth Census of the United States (1900), *Special Report on Employees and Wages*, Davis R. Dewey.
[7] The reader must not confuse the percentage of the income not derived from wages going to *wage-earners* in any particular income class with the percentage of the income not derived from wages going to *all income recipients* in any particular income class. Some of these last recipients are not wage earners at all, they receive no wages. Information concerning the second of these relations *but not the first* is given in the income tax reports.

concerning individual wage-earners' income distributions on these family data. The upper tails of the family-wage distributions *are* the tails of the wage distributions for the individuals who are the heads of the families. This is apparent from an analysis of the samples. Now income from rents and investments belongs almost totally to heads of families. Such income is however so small in amount that it cannot alter appreciably the slope of the tail.[1] While income from other sources than rents and investments (lodgers, garden and poultry, gifts and miscellaneous) may not be so confidently placed to the credit of the head of the family, this item changes its percentage relation to the total income so slowly as to be negligible in its effect upon the tail-slope of the distribution.[2] Notwithstanding the danger of reasoning too assuredly about individuals from these picked family distributions, we seem justified in believing that the tail-slopes of income distributions among individual wage earners are not very different from the tail-slopes of wage distributions among the same individuals.[3]

The upper tail-slopes of income distributions among typical wage earners

[1] For example, in the report on the incomes of 12,096 white families published in the *Monthly Labor Review* for December, 1919, we find the income from rents and investments less than one per cent of the total family income for each of the income intervals.

Income group	Percentage income from rents and investments is of total income
Under $900	.079
$ 900–$1,200	.176
1,200– 1,500	.410
1,500– 1,800	.551
1,800– 2,100	.606
2,100– 2,500	.998
2,500 and over	.778

[2] As a somewhat extreme example, the Bureau of Labor investigation mentioned in the preceding note shows the following relations between total family earnings and total family income (including income from rents and investments, lodgers, garden and poultry, gifts and miscellaneous).

Income group	Percentage that total earnings are of total income
Under $900	96.2
$ 900–$1,200	96.5
1,200– 1,500	96.3
1,500– 1,800	96.0
1,800– 2,100	96.3
2,100– 2,500	95.1
2,500 and over	96.2

[3] Further corroboratory evidence, of some slight importance, that the tail-slopes of wage distributions among wage earners are not very different from the tail-slopes of income distributions among wage earners is yielded by the fact that the tail-slopes of income distributions among families (which are virtually identical with the tail-slopes of both income and wage distributions among the heads of these families) have roughly the same range as the tail-slopes of wage distributions among individuals. The British investigation into the incomes of 7,616 workingmen's families in the United States in 1909 shows a tail-slope of about 3.5. (Report of the British Board of Trade on *Cost of Living in American Towns*, 1911. [Cd. 5609], p. XLIV.) The Bureau of Labor's investigation into the income of 12,096 white families in 1919 shows a tail-slope of about 4.0. Mr. Arthur T. Emery's extremely careful investigation into the incomes of 2,000 Chicago households in 1918 shows a tail-slope of about 4.4. At the other extreme we find that the Bureau of Labor's investigation into the income of 11,156 families in 1903 (*Eighteenth Annual Report of the Commissioner of Labor*, 1903, p. 558) shows a tail-slope of about 10.0, and that Mr. R. C. Chapin's investigation into the income of 391 workingmen's families in New York City (*Standard of Living Among Workingmen's Families in New York City*, p. 44) also shows a slope of about 10.0. The tails of these last two cases are very irregular so that the slope itself is not determinable with much precision.

may then be assumed to have much greater slopes than the upper tail-slopes of income distributions among capitalists and entrepreneurs. It does not seem possible to make any very definite statement concerning the body and lower tail of the capitalist and entrepreneurial distribution—even in so far as that term is a significant one.[1] All the evidence suggests that the mode of what we have termed the capitalist-entrepreneurial distribution is consistently higher than the wage-earners' mode.[2] Its lower income tail undoubtedly reaches out into the negative income range, which the tail of the wage-earners' distribution may, both *a priori* and from evidence, be assumed not to do. It seems a not irrational conclusion then to speak of the capitalist-entrepreneurial distribution as having a lesser tail-slope than the wage-earners' distribution on the *lower* income side as well as on the upper income side,[3] and as a corollary almost certainly a much greater dispersion both actual and relative than the wage-earners' distribution.

Though the above generalizations concerning differences between the wage-earners' income distribution and the capitalist-entrepreneurial income distribution seem sound, they tell but a fraction of the story. Aside from the difficulty of classifying all income recipients in one or the other of these two classes, we are faced with the further fact that investigation suggests that our two component distributions are themselves exceedingly heterogeneous.[4] We have already noted that wage distributions for different occupations and times are extremely dissimilar in shape and we suspect that the same applies to capitalist-entrepreneurial distributions. For example, what little data we possess suggest that the distribution of income among farmers has little in common with other entrepreneurial distributions.

Moreover, the component distributions, into which it would seem necessary to break up the complete income distribution before any rational description would be possible, not only have different shapes and different positions on the income scale (i. e., different modes, arithmetic averages, etc.), but *the relative position with respect to one another on the income scale* of these different component distributions changes from year to year.[5]

[1] In the total income curve there is a broad twilight zone where individuals are often both wage or salary earners and capitalists or even entrepreneurs.

[2] In the 1916 occupation distributions the only occupations showing more returns for the $4,000–$5,000 interval than the $3,000–$4,000 (that is the only occupations showing any suggestion of a mode) are of a capitalistic or entrepreneurial description—bankers; stock-brokers; insurance brokers; other brokers; hotel proprietors and restaurateurs; manufacturers; merchants; storekeepers; jobbers; commission merchants, etc.; mine owners and mine operators; saloon keepers; sportsmen and turfmen.

[3] Of course the very word *slope* is an ambiguous term to use concerning the tail of a curve which enters the second quadrant.

[4] Evidence suggesting definite heterogeneity in the "wage and salary" figures of the income-tax returns is presented in Chapter 30.

[5] This fact is one of the simpler pieces of evidence against the existence of a "law." Of course, even though the income distribution were made up of heterogeneous material, if

Table 28Q [1] is interesting as showing the changes in the relative positions of the arithmetic averages of different wage distributions in 1909, 1913 and 1918.

TABLE 28Q

CHANGES IN THE RELATIVE POSITIONS OF THE AVERAGE ANNUAL EARNINGS OF EMPLOYEES ENGAGED IN VARIOUS INDUSTRIES

Industry	1909	1913	1918
All Industries	100.0	100.0	100.0
Agriculture	48.2	45.4	54.7
Production of Minerals	95.7	104.4	119.0
Manufacturing:			
Factories	91.2	97.5	103.5
Hand Trades	111.7	103.5	110.8
All Transportation	104.9	105.4	119.3
Railway, Express, Pullman, Switching and Terminal Cos	104.0	108.2	129.3
Street Railway, Electric Light and Power, Telegraph and Telephone Cos	99.5	93.8	81.4
Transportation by Water	123.5	114.1	147.5
Banking	123.0	128.6	135.5
Government	118.1	113.8	83.0
Unclassified Industries	114.4	107.7	97.8

The data are so inadequate that the construction of a similar table for capitalist-entrepreneurial distributions is not feasible. However, there are comparatively good figures for total income of farmers and total number of farmers year by year.[2] The average incomes of farmers, year by year, were the following percentages of the estimated average incomes of all persons gainfully employed in the country.

	Percentages
1910	75.19
1911	69.13
1912	72.41
1913	74.88
1914	76.33
1915	80.45
1916	82.85
1917	104.51
1918	109.68
1919	103.95
1920	63.88

This is a wide range.

Exactly what effects have such internal movements of the component distributions upon the total income frequency distribution curve? This is a difficult question to answer as we have not sufficient data to break

component parts remained constant in shape *and in their relative positions with respect to one another on the income scale*, these relations would of themselves constitute a "law."

[1] Based upon *Income in the United States*, Vol. I, pp. 102 and 103.

[2] See *Income in the United States*, Vol. I, p. 112.

down the total, composite, curve into its component parts with any degree of confidence.[1] However, the movements of wages in recent years would appear to give us a clue to the sort of phenomena we might expect to find if we had complete and adequate data.

The slopes of the upper income tails of wages distributions are great, 4 to 5 or more.[2] Now the wage curve moved up strongly from 1917 to 1918 if we may judge by averages. The average wage of all wage earners in the United States [3] increased 15.6 per cent [4] from 1917 to 1918. During the same period the average income of farmers increased 19.1 per cent [5] and the average income of persons other than wage earners and farmers remained nearly constant. Total amounts of income by sources in millions of dollars were:

	1917	1918	Percentage 1918 was of 1917
Total Wages [a]	$27,795	$32,575	117.20
Total Farmers' Income	8,800	10,500	119.32
All other Income	17,265	17,291	100.15
Total Income	$53,860	$60,366	112.08

[a] Includes pensions, etc., and includes soldiers, sailors, and marines.

Stockholders in corporations saw income from that source actually decline from 1917 to 1918.[6] What happened to American income-tax returns during this time?

[1] The processes by which the income distribution curve published in *Income in the United States*, Vol. I, pp. 132–135 was arrived at were such that to use that material here would practically amount to circular reasoning. The conclusions arrived at here were used in building up that curve.

[2] The slope of the tail of the wage and salary curve in the 1917 income tax returns is only about 3.21 (compare, note 2, p. 377). However we must remember that the individuals there classified are largely of an entirely different type of "wage-earner" from those in the lower groups. In this upper group occur the salaried entrepreneurs, professional men, etc., and those whose "salaries" are really profits or dividends. The evidence points to a rather distinct and significant heterogeneity along this division in the wage and salary distribution. See Chapter 30.

[3] Excluding soldiers, sailors, and marines, and professional classes but including officials and "salaried entrepreneurs."

[4] From $945 per annum in 1917 to $1,092 per annum in 1918.

[5] From $1,370 per annum in 1917 to $1,632 per annum in 1918.

[6] CORPORATION DIVIDENDS, SURPLUS AND EARNINGS

(In millions of dollars)

	Dividends	Surplus	Net earnings
1917	3,995	3,963	7,958
1918	2,568	1,945	4,513

See page 324.

TOTAL AMOUNT OF NET INCOME RETURNED BY SOURCES (RETURNS REPORTING OVER $2,000 PER ANNUM NET INCOME) [a]

(Millions of dollars)

Income class	Wages and salaries		All other sources [b]	
	1917	1918	1917	1918
Over $2,000	$3,648	$6,493	$7,543	$7,198
2,000- 4,000	1,553	3,687	1,799	2,036
4,000- 5,000	301	703	528	736
5,000–10,000	661	849	1,167	1,296
Over 10,000	1,133	1,254	4,049	3,130

[a] Wages income from returns reporting between $1,000 and $2,000 per annum is not available for 1917.

[b] "Other sources" are total *net* income minus wages and salaries, i. e., total *general deductions* have been assumed as deductible from other sources (gross). All things considered, this seems proper here though it may easily be criticised. In connection with changes in the relation between *net* and *gross* income from 1917 to 1918 see Chapter 30, pp. 401 and 402.

While reported income from all other sources than wages and salaries declined 4.6 per cent,[1] reported income from wages and salaries increased 78.0 per cent.[2] Moreover, the great increases in wages and salaries were in the lowest intervals. The wage curve with its steep tail-slope was moving over into the income tax ranges.[3] The effect upon the total curve is very pronounced, as may be seen from Table 28R.

TABLE 28R

AMERICAN INCOME TAX RETURNS IN 1917 AND 1918

Total Number of Returns
(In thousands)

	1917	1918	Percentage 1918 was of 1917
$2,000–$4,000	1,214	2,107	173.56
4,000- 5,000	186	322	173.12
5,000–10,000	271	319	117.71
Over 10,000	162	160	98.77

On a double log scale we see the curve changing its shape radically. While the 1917 curve is comparatively smooth and regular, the 1918 curve develops a distinct "bulge" in the lower ranges.[4]

The preceding discussion has been concerned with equal dollar-income

[1] Had "other sources" been taken gross instead of net, that item would have shown an increase of 5.3 per cent instead of a decrease of 4.6 per cent.

[2] The actual spread is still greater than the figures show. Income from professions, which in 1917 was classed under *wages*, in 1918 and 1919 was classed under *business*.

[3] This seems to be a fact though it is not the whole story. The "intensive drive" of 1919 may easily account for some of the increase. See Chapter 30 for a discussion of the probable amount of this influence.

[4] *in the United States*, Vol. I, Charts 28 and 30.

intervals. However, $2,000 income in 1918 was relatively less than $2,000 income in 1917. The average (per capita) income of the country was $523 in 1917 and $586 in 1918.[1] The adjustment is theoretically crude, but $2,241 [2] in 1918 might be considered as in one sense equivalent to $2,000 in 1917. The results of comparisons of the two years upon this basis are given in Table 28S.[3]

TABLE 28S

INCOME RETURNED—BY SOURCES

(Millions of dollars)

1917

Income class	Wages and salaries	Total *net* income	Total *net* income minus wages and salaries	Total *gross* income	Total *gross* income minus wages and salaries
$2,000–$4,000....	$1,553	$3,352	$1,799	$3,713	$2,161
4,000– 5,000....	301	829	528	895	594
5,000–10,000....	661	1,828	1,167	1,951	1,290
Over 10,000....	1,133	5,182	4,049	5,518	4,384
1918					
$2,241–$4,482....	$3,236	$5,359	$2,123	$5,766	$2,530
4,482– 5,602....	498	1,111	613	1,247	749
5,602–11,205....	773	1,960	1,187	2,315	1,542
Over 11,205.....	1,153	4,129	2,976	4,842	3,689
(Multiplied by $\frac{523}{586}$, that is reduced to "1917 dollars")					
$2,241–$4,482....	$2,888	$4,783	$1,895	$5,146	$2,258
4,482– 5,602....	445	992	547	1,113	668
5,602–11,205....	690	1,749	1,059	2,066	1,376
Over 11,205....	1,029	3,685	2,656	4,321	3,292
(Percentages of Total Income of Country)					
1917					
$2,000–$4,000....	2.88	6.22	3.34	6.89	4.01
4,000– 5,000....	.56	1.54	.98	1.66	1.10
5,000–10,000....	1.23	3.39	2.16	3.62	2.39
Over 10,00.....	2.10	9.61	7.51	10.24	8.14
1918					
$2,241–$4,482....	5.30	8.78	3.48	9.45	4.15
4,482– 5,602....	.82	1.82	1.00	2.05	1.23
5,602–11,205....	1.27	3.21	1.94	3.80	2.53
Over 11,205....	1.89	6.77	4.88	7.94	6.05

[1] *Income in the United States*, Vol. I, p. 76.

[2] $\$2,000 \times \frac{586}{523}$.

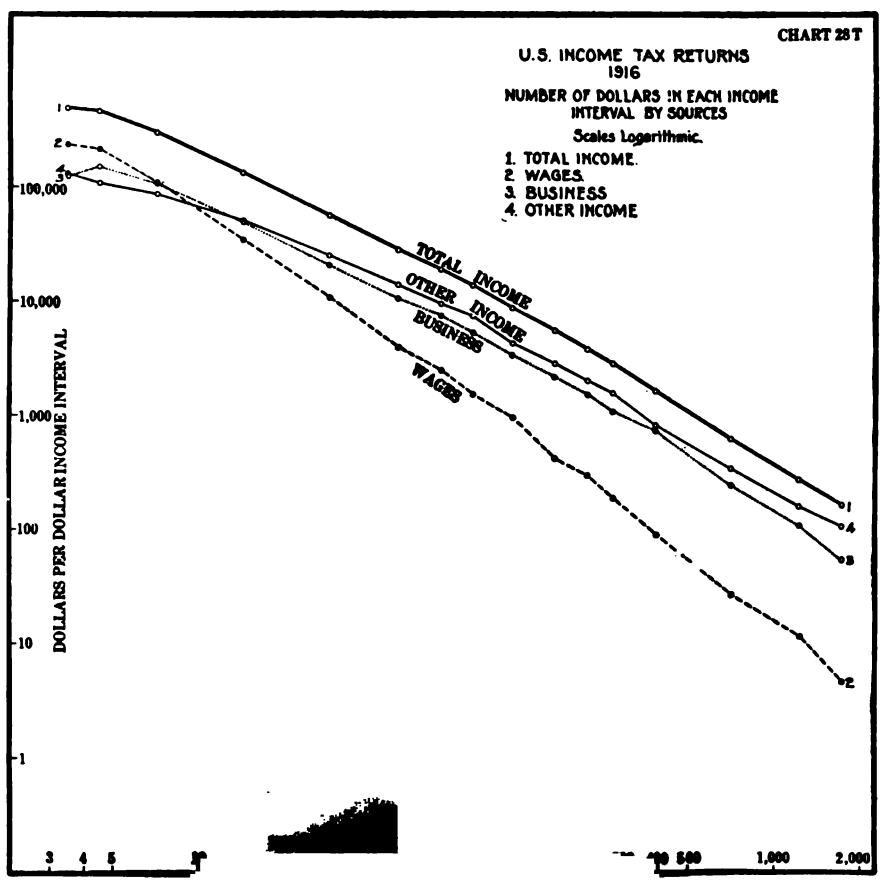
[3] The figures for the amounts of income in the irregular 1918 income intervals of that table ($2,241–$4,482, etc.) were calculated by straight line interpolation on a double log scale applied to the even thousand dollar intervals of the income-tax returns. Though the total income curve does not approximate linearity it may be assumed linear within the range of one income tax interval without serious error.

(Table 28S concluded.)

NUMBER OF RETURNS
(Thousands)

Income class	1917	Income class	1918	Percentage 1918 was of 1917
$2,000–$4,000	1,214	$2,241–$4,482	1,758	144.81
4,000– 5,000	186	4,482– 5,602	220	118.28
5,000–10,000	271	5,602–11,205	260	95.94
Over 10,000	162	Over 11,205	136	83.95

It is from this table once again apparent that the wage distribution moved independently up on the income scale and that the effect of this movement was confined to the lowest income intervals. Charts 28T, 28U, 28V, 28W, 28X, 28Y, 28Z, and 28AA which show the number of dollars income per dollar-income interval, by sources, are enlightening as illustrating in still



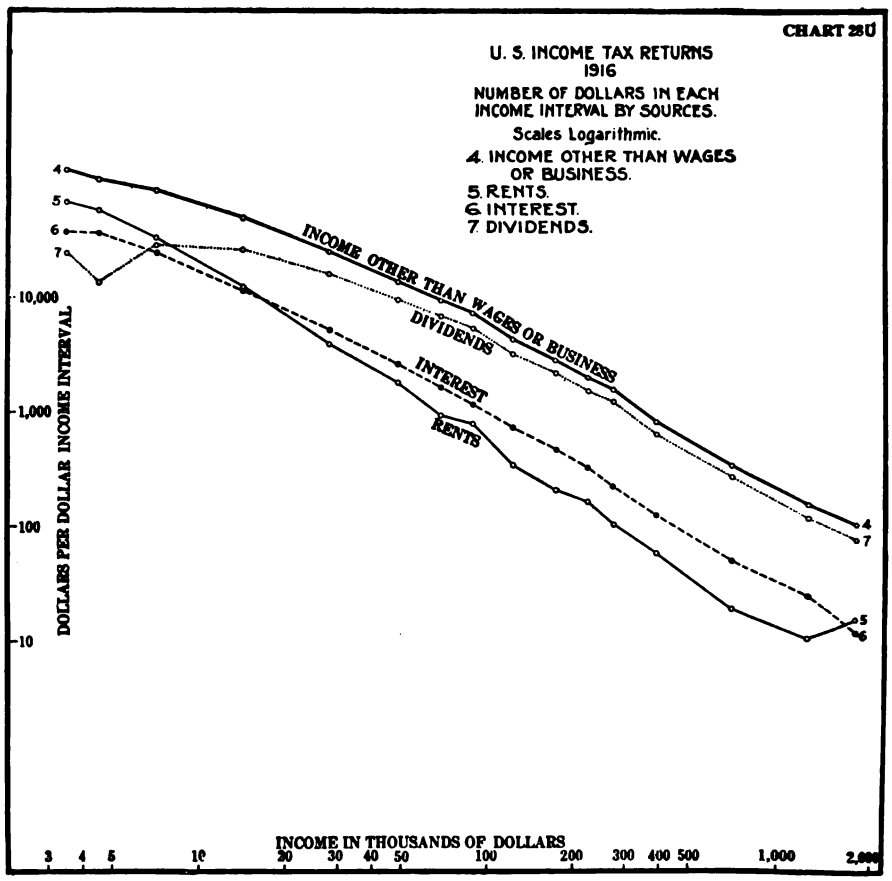


CHART 28U
U. S. INCOME TAX RETURNS
1916
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES.
Scales Logarithmic.
4. INCOME OTHER THAN WAGES OR BUSINESS.
5. RENTS.
6. INTEREST.
7. DIVIDENDS.
INCOME OTHER THAN WAGES OR BUSINESS
DIVIDENDS
INTEREST
RENTS
DOLLARS PER DOLLAR INCOME INTERVAL
10,000
1,000
100
10
INCOME IN THOUSANDS OF DOLLARS
3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000

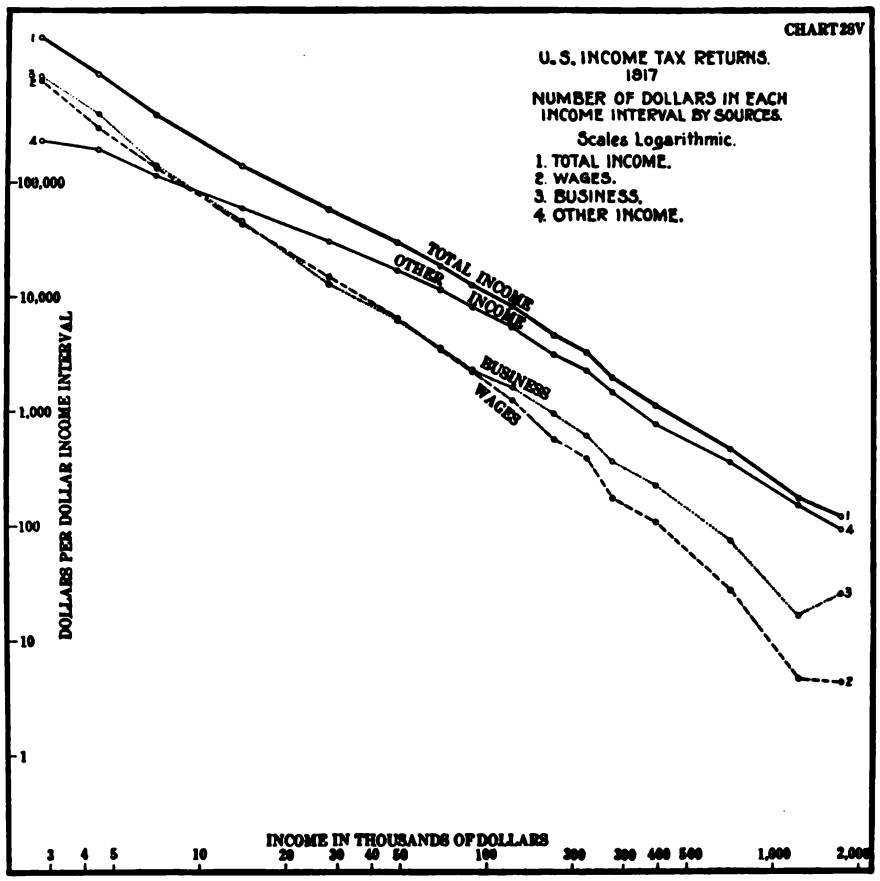


CHART 28V
U. S. INCOME TAX RETURNS.
1917
NUMBER OF DOLLARS IN EACH INCOME INTERVAL BY SOURCES.
Scales Logarithmic.
1. TOTAL INCOME.
2. WAGES.
3. BUSINESS.
4. OTHER INCOME.
TOTAL INCOME
OTHER INCOME
BUSINESS
WAGES
DOLLARS PER DOLLAR INCOME INTERVAL
100,000
10,000
1,000
100
10
1
INCOME IN THOUSANDS OF DOLLARS
3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000

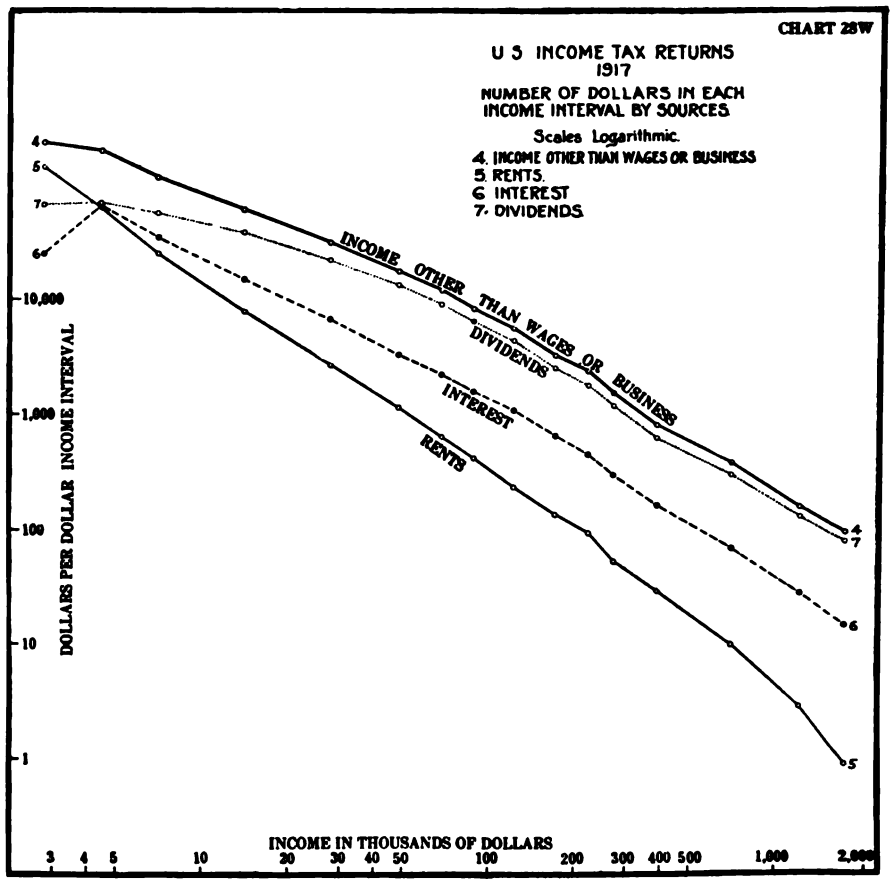


CHART 28W
U S INCOME TAX RETURNS
1917
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES
Scales Logarithmic.
4. INCOME OTHER THAN WAGES OR BUSINESS
5. RENTS.
6 INTEREST
7. DIVIDENDS
INCOME OTHER THAN WAGES OR BUSINESS
DIVIDENDS
INTEREST
RENTS
DOLLARS PER DOLLAR INCOME INTERVAL
10,000
1,000
100
10
1
INCOME IN THOUSANDS OF DOLLARS
3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000

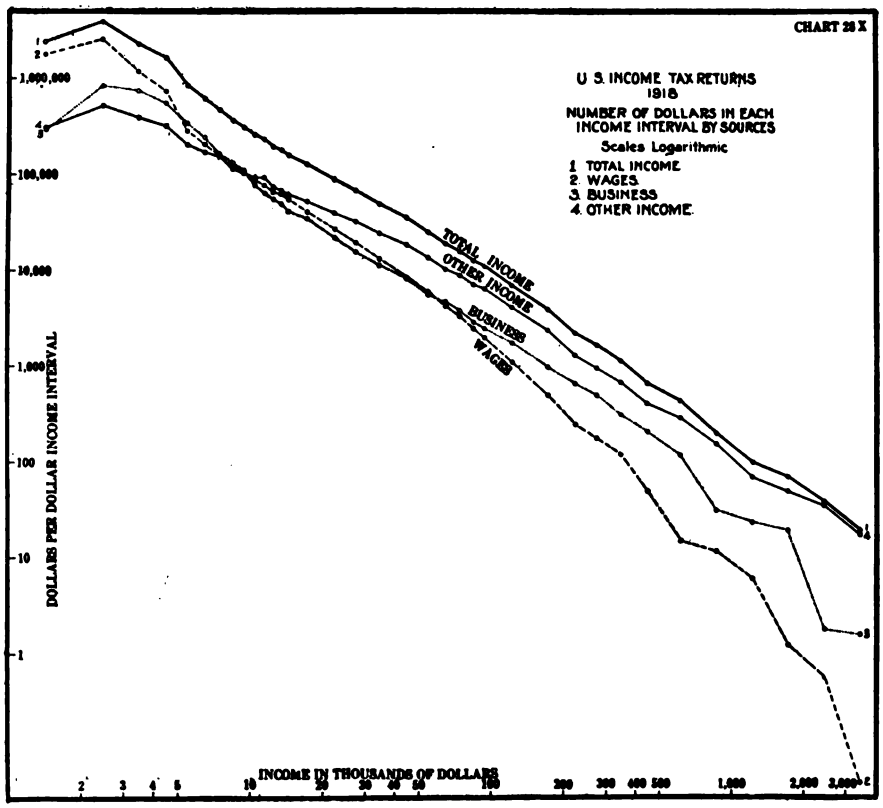


CHART 28 X
U. S. INCOME TAX RETURNS
1918
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES
Scales Logarithmic
1. TOTAL INCOME
2. WAGES
3. BUSINESS
4. OTHER INCOME
TOTAL INCOME
OTHER INCOME
BUSINESS
WAGES
DOLLARS PER DOLLAR INCOME INTERVAL
INCOME IN THOUSANDS OF DOLLARS

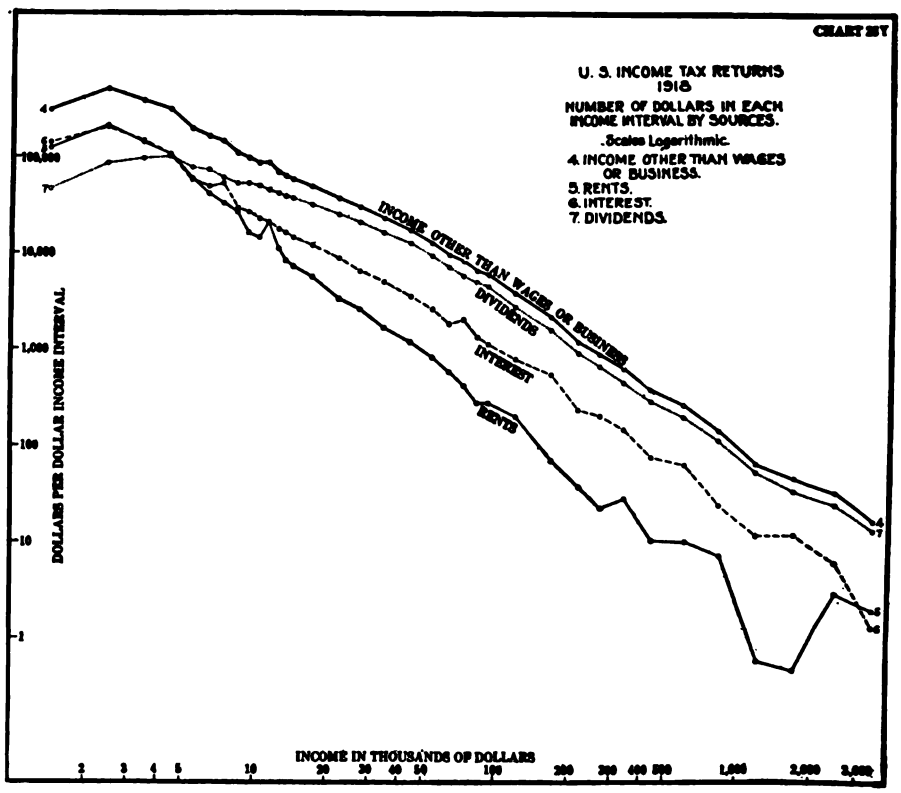


CHART 27
U. S. INCOME TAX RETURNS
1918
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES.
Scales Logarithmic.
4. INCOME OTHER THAN WAGES
OR BUSINESS.
5. RENTS.
6. INTEREST.
7. DIVIDENDS.
INCOME OTHER THAN WAGES OR BUSINESS
DIVIDENDS
INTEREST
RENTS
DOLLARS PER DOLLAR INCOME INTERVAL
INCOME IN THOUSANDS OF DOLLARS

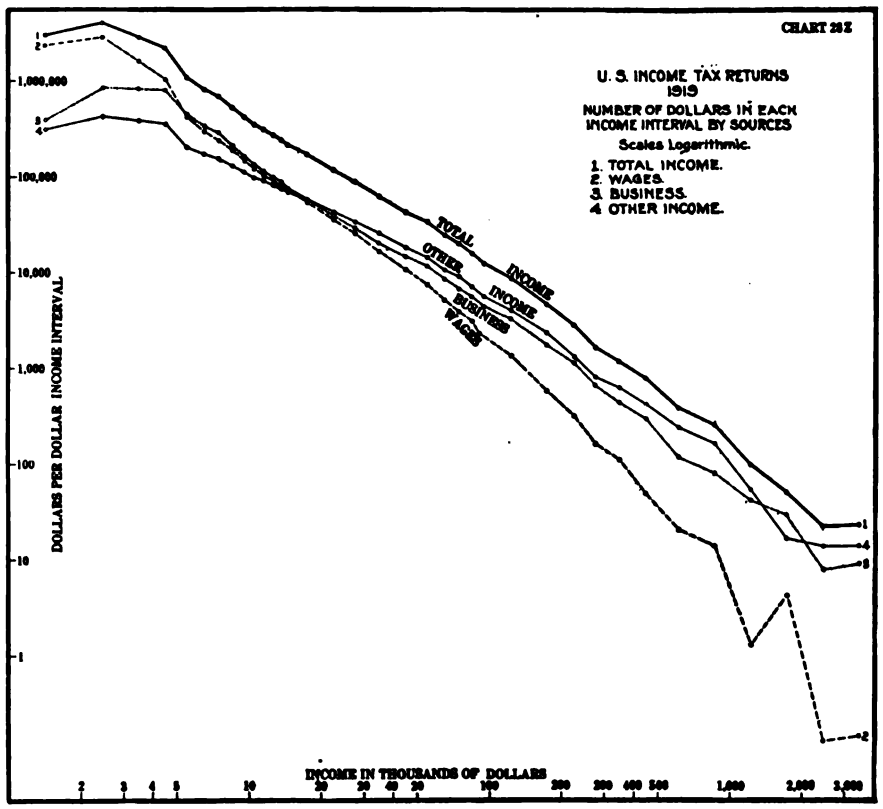


CHART 28Z
U. S. INCOME TAX RETURNS
1919
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES
Scales Logarithmic.
1. TOTAL INCOME.
2. WAGES.
3. BUSINESS.
4. OTHER INCOME.
TOTAL INCOME
OTHER INCOME
BUSINESS
WAGES
DOLLARS PER DOLLAR INCOME INTERVAL
1,000,000
100,000
10,000
1,000
100
10
1
INCOME IN THOUSANDS OF DOLLARS
2
3
4
5
10
20
30
40
50
100
200
300
400
500
1,000
2,000
3,000

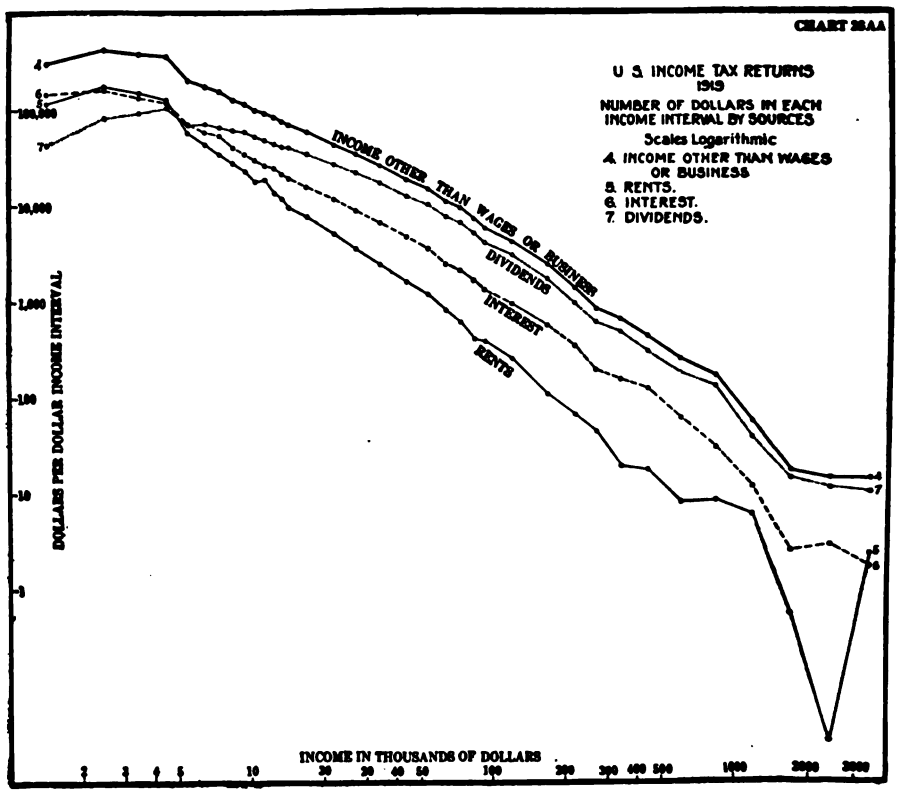


CHART 28AA
U S INCOME TAX RETURNS
1919
NUMBER OF DOLLARS IN EACH
INCOME INTERVAL BY SOURCES
Scales Logarithmic
4. INCOME OTHER THAN WAGES
OR BUSINESS
5. RENTS.
6. INTEREST.
7. DIVIDENDS.
INCOME OTHER THAN WAGES OR BUSINESS
DIVIDENDS
INTEREST
RENTS
DOLLARS PER DOLLAR INCOME INTERVAL
INCOME IN THOUSANDS OF DOLLARS

greater detail the changes in the constitution of the returns from year to year.

Such material and the appearance of the "bulge" on the income-tax curve in the lowest income ranges [1] in the years 1918 and 1919 when wages and salaries were high and average (per capita) incomes also high [2] strongly suggest that the income curve, in so far as it shows any similarity from year to year, changes its general appearance and turns up (on a double log scale) as it approaches those ranges where wages and salaries are of predominant influence.[3] The great *slopes* of wage distributions are on this hypothesis not inconsistent with the smaller *slope* of the general income curve in its higher (income-tax) ranges.[4]

Conclusions:

(1) Pareto's Law is quite inadequate as a mathematical generalization, for the following reasons:
   (a) The tails of the distributions on a double log scale are not, in a significant degree, linear;
   (b) They could be much more nearly linear than they are without that condition being especially significant, as so many distributions of various kinds have tails roughly approaching linearity;
   (c) The straight lines fitted to the tails do not show even approximately constant slopes from year to year or between country and country;
   (d) The tails are not only not straight lines of constant slope but are not of the same shape from year to year or between country and country.

(2) It seems unlikely that any useful mathematical law describing the entire distribution can ever be formulated, because:
   (a) Changes in the shape of the income curve from year to year seem traceable in considerable measure to the evident heterogeneity of the data;
   (b) Because of such heterogeneity it seems useless to attempt to

[1] See Chapter 30 for further discussion of this "bulge" in connection with an examination of how far it may be the result of irregularity in reporting.

[2] Average (per capita) incomes being high means that a definite money income (such as $2,000) takes us relatively further down the income curve than if average incomes were low.

[3] It is difficult to say just where the "bulge" might have appeared in the 1917 distribution if as great efforts had been made to obtain correct returns in that year as were made under the "intensive drive" for 1918 returns. The *wages* line on the 1917 number of dollars income per dollar-income interval chart (Chart 28V) shows signs of turning up somewhere between $4,000 and $5,000 and the *business* line somewhere in the $5,000–$10,000 interval. However neither movement is large nor can their positions be accurately determined on account of the size of the reporting intervals. See also Chapter 30, p. 412.

[4] The "bulge" on the income from wages and salaries curve itself, as seen in the income-tax returns for 1918 and 1919 (see Charts 28X and 28Z), seems the result of heterogeneity in these wage and salary data themselves. This hypothesis is considered in Chapter 30.

describe the whole distribution by any mathematical curve designed to describe homogeneous distributions (as any *simple* mathematical expression must almost necessarily be designed to do);

(c) Furthermore, the existing data are not adequate to break up the income curve into its constituent elements;

(d) If the data were complete and adequate we might still remain in our present position of knowing next to nothing of the nature of any "laws" describing the elements.[1]

(3) Pareto's conclusion that economic welfare can be increased only through increased production is based upon erroneous premises. The income curve is not constant in shape. The internal movements of its elements strongly suggest the possibility of important changes in distribution. The radically different mortality curves for Roman Egypt and modern England,[2] and the decrease in infant mortality in the last fifty years illustrate well what may happen to heterogeneous distributions.

The next four chapters review the data from which any income frequency distribution for the United States must be constructed.

[1] Though all the evidence points to hope of further progress lying in the analysis of the parts rather than in any direct attack upon the unbroken heterogeneous whole.

[2] See *Biometrika*, Vol. I, pp. 261–264.

CHAPTER 29

OFFICIAL INCOME CENSUSES

There has never been a complete income census of the American people. The Federal income-tax data cannot take the place of such a census. Respecting the distribution of income among persons having incomes of less than $1,000 Federal income-tax data give us no information whatsoever. Furthermore, on account of the exemption of married persons, comparatively little use can be made of the $1,000 to $2,000 interval. The number of persons reporting incomes over $2,000 in our best year, 1918, was only 7.3 per cent of the estimated total number of income-recipients in the country. Moreover, not only because of direct evasion and illegal non-reporting, but also because of "legal evasion" and the large amount of tax-exempt income which need not be reported at all, these income-tax data cannot give an approximately correct picture of even that part of the frequency curve which lies above $2,000. The adjustments of the income-tax data necessary to obtain such a picture are extremely large, as we shall presently see.

Only one country in the world has ever taken an official income census which made any pretense of completeness. Under the War Census Act the Commonwealth of Australia took an official income census of incomes received during the year ended June 30, 1915, by everyone, man, woman, or child, who was "possessed of property, or in receipt of income." [1] The results of that census are summarized by G. H. Knibbs, the Commonwealth Statistician, in *The Private Wealth of Australia and its Growth. A Report of the War Census of 1915.* (See Table 29A and Charts 29A, 29B and 29C.)

Now while it would naturally be impossible to construct a complete frequency distribution for American incomes from Australian data,[2] we might perhaps hope to discover some characteristics of income-distribution

[1] While the first clause of the Australian "Wealth and Income Card" stated merely that it was "to be filled in by all persons aged 18 or upwards possessed of property, or holding property on trust, or in receipt of income," etc. (p. 9), "a special instruction was issued that in the case of all persons under the age of 18, possessed of property, or in receipt of income, a return must be furnished by the parent or guardian in respect of such property or income." (p. 10.) The income from such trust funds was not all, but only "in the main," allocated to individual beneficiaries. (p. 22.)

G. H. Knibbs, *The Private Wealth of Australia and its Growth. A Report of the War Census of 1915.*

[2] Aside from the questionableness of such a procedure, the large size of the low income intervals in the Australian distribution and the lack of information concerning the amount of negative income make that distribution a difficult one to work with. A classification by such large intervals tells very little.

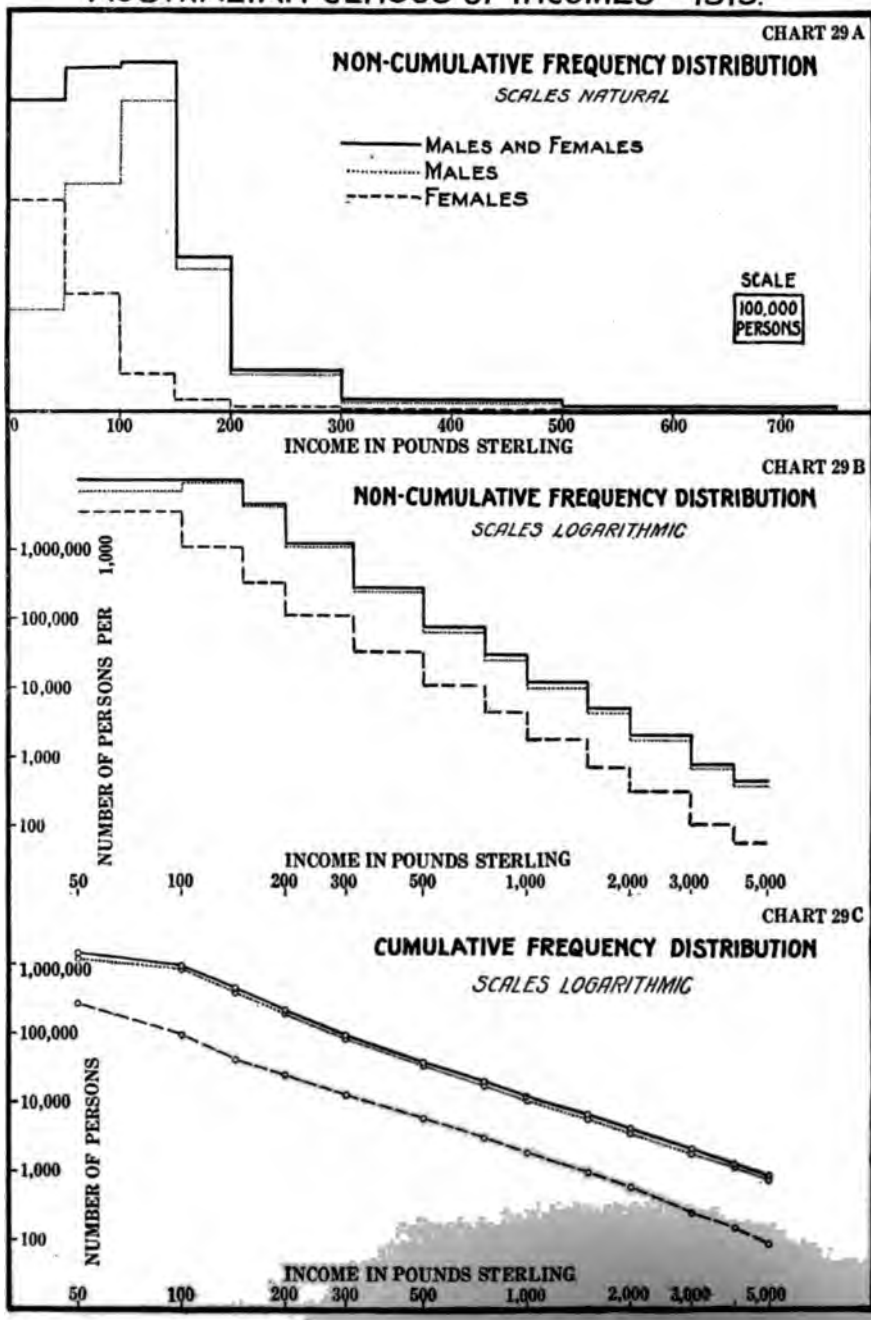
TABLE 29A

AUSTRALIAN WAR CENSUS OF INCOMES
NET INCOME FOR TWELVE MONTHS ENDED JUNE 30, 1915

Income class	Males			Females			Total persons		
	Number	Amount of income (Nearest thousand pounds)	Average income [a] (Pounds)	Number	Amount of income (Nearest thousand pounds)	Average income [a] (Pounds)	Number	Amount of income (Nearest thousand pounds)	Average income [a] (Pounds)
Deficit and nil	66,460			249,476			315,936		
Under £50	145,513	4,163	29	301,592	6,717	22	447,105	10,880	24
£ 50 and under £100	327,835	24,308	74	168,106	11,416	68	495,941	35,725	72
100 " " 150	448,195	55,090	123	52,929	6,250	118	501,124	61,340	122
150 " " 156	46,630	7,093	152	3,651	558	153	50,281	7,651	152
156 " " 200	157,350	27,219	173	12,697	2,211	174	170,047	29,431	173
200 " " 300	106,324	25,191	237	11,001	2,641	240	117,325	27,832	237
300 " " 500	49,108	18,388	374	6,617	2,498	378	55,725	20,887	375
500 " " 750	15,928	9,603	603	2,691	1,633	607	18,619	11,236	603
750 " " 1,000	6,313	5,393	854	1,145	970	847	7,458	6,363	853
1,000 " " 1,500	4,933	5,994	1,215	905	1,089	1,204	5,838	7,083	1,213
1,500 " " 2,000	2,132	3,676	1,724	364	629	1,729	2,496	4,306	1,725
2,000 " " 3,000	1,707	4,149	2,431	317	772	2,434	2,024	4,921	2,431
3,000 " " 4,000	659	2,249	3,412	102	361	3,537	761	2,610	3,429
4,000 " " 5,000	375	1,685	4,494	58	258	4,455	433	1,944	4,489
5,000 " over	746	7,300	9,786	86	656	7,627	832	7,956	9,563
Total	1,380,208	201,503	146	811,737	38,661	48	2,191,945	240,163	110

[a] The above averages are not always consistent with the other figures of the table. They have evidently not been calculated from the *approximate* figures given above for amount of income.

AUSTRALIAN CENSUS OF INCOMES - 1915.



curves in general from this, the only actual census ever taken. A knowledge of such general characteristics might then, quite imaginably, be a little helpful in the problem of describing the American or any other income distribution.

However, when we come to examine the Australian figures, we find that they have certain pronounced peculiarities which would be extremely difficult to read into the American material. For example, the Australian distribution shows a flatness and lack of pronounced mode totally unlike the results we have built up from an analysis of American data. In the Australian distribution there are nearly the same number of persons having incomes between 0 and £50, £50 and £100, and £100 and £150.[1]

What are the causes of this rather startling peculiarity of the Australian frequency curve? [2] In the first place let us suggest a possibly minor but by no means necessarily negligible factor. We know little about the goodness of the Australian reporting in this census. Income is, from its nature, a difficult subject to investigate. When the material is collected by means of schedules to be filled in by the informants, as was the case in the Australian census, the returns may easily be full of errors. The average individual is surprisingly ignorant concerning the amount of his total income. The further fact that the census was taken in order to estimate possibilities of future taxation may well have been a powerful incentive towards great irregularities all along the line, but especially in the lower income groups. Persons whose income brought them distinctly into the upper groups (over £156) were, at the time of the income census, about to make returns under oath for income-tax purposes and would hardly care to show a radical discrepancy between the two returns. On the other hand, many persons, whose true incomes were around £156 and the modal income, might easily have "underestimated" with the idea of evading if possible future taxation based upon a lowering of the exemption limit. The result of such practices would tend to show up graphically in a flattening of the curve in the vicinity of the mode of the distribution and a raising of the numbers in the lowest groups. [3]

However, poor reporting is probably only a secondary element accounting for the peculiarities of the Australian curve. It is most of all the

[1] See Table 29A and Chart 29A.

[2] Notwithstanding the fact that distributions for different times and for different countries probably vary greatly (see Chapter 28), the difference between the Australian curve and the Bureau's American estimate seems too radical to explain upon this basis.

[3] It is difficult to determine the extent of actual non-reporting. The number of males filling out income cards was 2,527,831. All males "possessed of property, or in receipt of income" are supposed to be included in this number. It amounted, however, to only 54.60 per cent of the total male population. Males "possessed of property, or in receipt of income" necessarily constitute a larger percentage of the total male population than do male "breadwinners," yet in the Australian census of 1911 male breadwinners constituted 69.4 per cent of the total male population, and male breadwinners 20 years of age or older 58.9 per cent. Even if we assume that the number of income returns for males under 18 was negligible we still are faced with a discrepancy difficult to account for.

concentration of female returns in the lowest income groups which gives the flat and modeless appearance to the total curve. The Australian frequency distribution among males only, is much more like our estimated American distribution [1] than is the Australian distribution among males and females together. Now the concentration of female returns in the lower income intervals would seem to be the result of a large number of returns made by women and female children receiving petty incomes from property who would be classified, in the Australian Census of Population, as "dependents" and not as "breadwinners." [2]

Of the total female population in 1915, 33.46 per cent made out income cards and 23.18 per cent reported positive incomes (10.28 per cent reported zero or negative incomes). But according to the Australian census of 1911, only 18.6 per cent of the total female population were classified as "breadwinners." Thus the women reporting positive incomes in 1915 constituted a much larger percentage of the total female population than did female "breadwinners" in 1911 of the total female population in that year. The discrepancy seems too great to be accounted for by the increase in the number of women "breadwinners" caused by the war. More than half of the 23.18 per cent of the female population reporting positive incomes in 1915 reported incomes under £50 per annum. Moreover, the average income of this group was only £22 per annum—under the arithmetic average of the interval. This strongly suggests petty incomes from property, and part time occupations such as keeping boarders, lodgers, chickens, etc., rather than any great increase in the number of female "breadwinners." The fact that over 30 per cent of the returns made by females reported zero or negative incomes is further evidence that the large number of extremely small incomes reported was largely the result of the schedule calling for income returns from all persons "possessed of property."

Negative incomes arise in general from business or speculative losses. Bad as may be the condition of any laboring class, its members are seldom faced with negative incomes. It is unlikely that many of the 249,476 females reporting "deficit and nil" were wage-earners. They were in general the owners of small investments which showed losses, such as town lots upon which taxes had been paid.[3]

[1] See *Income in the United States*, Vol. I, pp. 128, 129, 132–135.

[2] All persons are classified as "breadwinners" or as "dependents" by the Australian census. Male "breadwinners" in Australia constituted in 1911, according to the census of that year, 69.4 per cent of the total male population, female "breadwinners" 18.6 per cent of the total female population, and total "breadwinners" 45.0 per cent of the total population. These figures compare with American census figures for 1910 showing males "gainfully employed" to constitute 63.6 per cent of total males, females "gainfully employed" 18.1 per cent of total females, and total "gainfully employed" 41.5 per cent of the total population.

[3] It is worth noting that in the Australian schedule "rates and taxes paid" could be deducted before making an income return. This consideration may be of some importance in explaining the very large number of small, zero, and negative incomes.

While the frequency curve for Australian males is much more like the American distribution than the curve representing both male and female Australian income recipients, even it shows a much greater concentration in the lowest income intervals than does the American distribution. This can probably be accounted for to some extent by a large number of income returns for young male "dependents" "possessed of property."

The essential difference in appearance between the American income-distribution curve which we presented in Volume I and the Australian curve of 1915 is, then, probably traceable to (1) Australian underreporting and (2) Australian inclusion of a large number of "dependents" who received petty incomes from property and who were in no important sense "breadwinners" or "gainfully employed."

What shall we say about the desirability or undesirability of including in an income frequency distribution dependents receiving petty incomes from property? While it is true that their incomes, positive or negative, are in a way as real as any other incomes, we must remember that probably almost all individuals over six years of age not only receive but *earn* some money income during each year. Shall we then include the entire population over six years old in our distribution? As we approach this theoretical limit it is seen that the concept becomes less and less practically or even theoretically interesting. Both practically and theoretically we are interested in the incomes of persons who, though they be minors, have "economically come of age" and have entered into certain definite relations to the machinery of factorial distribution. They are "breadwinners" or "persons gainfully employed," and the concept back of such expressions, though like many economic concepts somewhat of a compromise, seems a good compromise for our purposes.

Defining income recipient as we have, we cannot use the Australian material as an aid to the graduation or adjustment of the American income-distribution curve in its lower ranges. In the upper income ranges, the Australian distribution offers, as we shall see, an interesting illustration of the same double swing (letter S) appearance of the curve seen in some of the more recent American data.[1]

[1] When charted on a double log scale.

CHAPTER 30

AMERICAN INCOME TAX RETURNS

At the beginning of the preceding chapter attention was drawn to some reasons why income-tax returns cannot take the place of an adequate income census. Nevertheless tax returns are in many respects the most important single source of information we have for estimating the frequency distribution of incomes. Were there neither tax returns nor income censuses for any country, it is difficult to see how we could make even an interesting guess as to the distribution of income in the upper ranges.

American income-tax data go back to 1913. We have now at our disposal returns for the seven years, 1913 to 1919, inclusive.[1] However, the amount of information given in the official reports for the earlier years 1913, 1914 and 1915 is not great. Little is shown beyond the number of returns classified by large income intervals and the same returns classified by districts. The 1916 tax report is the most voluminous and in one respect the most adequate report which has yet appeared.[2] It contains a set of tables which we are sorry to miss in the later reports, showing the frequency distribution of incomes by separate occupations. Other features of this report which have been retained in later years are tables showing both number of returns and amount of net income for each income class for the country as a whole, and the same by States; tables showing the sources of the income returned in each income interval, that is the amount from wages, business, property; distribution tables arranged by sex and conjugal condition; amounts of tax collected from each income class, etc.

Changes in the Federal Income Tax Law during the period have not been such as greatly to affect any conclusions which we have drawn from the data. From the standpoint of this investigation, probably the most important changes in the law relate to *general deductions*, *professions*, and *minimum taxable income*.

In the 1916 returns all deductions were classified as *general deductions*.

[1] The *Annual Reports of the Commissioner of Internal Revenue* are the sources for American income-tax data for the years 1913 to 1915. Since 1915 the data have appeared annually as a separate Treasury Department publication entitled *Statistics of Income*.

[2] A peculiarity of the 1916 data is that the returns are tabulated as family rather than individual returns. "The net incomes reported on separate returns made by husband and wife in 1916 are combined and included as one return in the figures for the several classes." *Statistics of Income*, 1917, p. 22.

tain correct returns but individuals, under the spur of patriotism, seem to have made less effort to evade.[1]

The remainder of this chapter is concerned largely with a discussion of possible irregularities in the *distribution* of non-reporting and understatement in the later years. While the total amount of non-reporting and understatement was almost certainly greater in the returns for 1917 than in those for 1918 and 1919, are we sure that the non-reporting and understatement of these later years are not possibly more irregularly distributed along the frequency curve than was the case in 1917? Is it possible that the improvement in the accuracy of the published returns for 1918, as compared with those for 1917, was so much greater in the income intervals under $5,000 that the resulting change in the shape of the frequency curve may amount to something almost akin to an "over-adjustment"?

Income returns by individuals are made on two types of blanks, a blank to be filled in by persons reporting incomes under $5,000 and another blank to be filled in by persons reporting incomes over that figure. Now, while the returns of incomes under $5,000 and made on "under $5,000" blanks are examined, investigated and audited in the field soon after their receipt, the investigation and audit of the returns for incomes over $5,000 are handled in Washington. If an individual has an actual income of $8,000 but reports $4,600 (on an "under $5,000" blank), as soon as a Field Collector discovers this discrepancy, he passes the matter over to the Revenue Agent in charge of the District for Field Investigation. The return, accompanied by the Agent's report, is forwarded to Washington for final audit. Thus the Field Collectors audit only returns that are (a) made on "under $5,000" blanks and (b) believed, *after investigation*, to be for incomes which are *actually* under $5,000.

While the Field Audit of returns of these incomes is well under way before the preparation of the statistical tables in the *Statistics of Income* and hence appears in that tabulation to an unknown extent, the Washington audit of incomes over $5,000 has hardly begun and hence the amended figures for these higher incomes do not appear in the *Statistics of Income.* It is impossible to say exactly how much of the "bulge" [2] which appears in the $1,000 to $5,000 interval on the double log charts of the 1918 and 1919 tax income distributions is caused by a difference in the accuracy of the published figures for returns of incomes under and over $5,000. However, the Treasury Department states that "the *Statistics of Income*

[1] It must not, of course, be assumed that the increase in the number of returns in 1917 is traceable solely to increased goodness of reporting.

[2] Described in Chapter 28. At many points in the following discussion the reader should refer back to the presentation of the case for heterogeneity in the income-tax data contained in Chapter 28.

are compiled almost entirely from unaudited returns whether they be for 'under $5,000' or 'over $5,000.'" It seems probable therefore that the sudden change in slope of the 1918 curve (on a double log scale) at about $5,000 can be explained only partially by a change in accuracy of the published returns at that point.

Moreover, a considerable amount of evidence, some of which has already been presented in Chapter 28, suggests that the "bulge" on the income curves for the later years corresponds to a reality on the actual income curves. While it may be somewhat over-accented in the published figures for 1918 and 1919, and while the figures for 1917 might have shown more of such a "bulge" [1] had the reporting been better, we must not assume that the published figures for either 1917 or 1918 give a radically incorrect picture of the facts merely because the income curves for the two years are so different. The dogma of the similarity of the income curve from year to year has little evidence to support it.

It is by no means certain that even the apparently definite and sharp angles on the curves in this $4,000 to $6,000 region give an unreal picture. While it is true that we find the same angles on the wages and salaries curve, that curve itself seems heterogeneous. An income distribution curve composed of wage and salary earners (in the ordinary sense of the terms) may well cut an income distribution curve composed of "salaried entrepreneurs," and business and financial experts somewhere in the lower income ranges. The angle on the composite curve may give a decidedly accurate picture of the facts.[2]

Let us see what light the data throw on some of these problems. Table 30A showing the number of returns for the lower income intervals in 1917, 1918, and 1919 and the percentage movements from year to year illustrates the great increase in the number of returns in the under-$5,000 intervals between 1917 and the later years.

Chart No. 28 of Volume I, on which are drawn the frequency distributions for each year from 1916 to 1919 on a double log scale, shows the difference in the appearance of the income curves for the three years. Examining that chart we notice that the 1918 data-points, which in the upper income ranges run nearly as smoothly as the 1917 points, in the $4,000 to $5,000 interval move abruptly upwards and from there on into the lowest income ranges are well above the 1917 points, showing on the chart an irregular, plateau-like effect in these lowest income ranges. No such "plateau" is apparent on the 1917 line. The year 1919 presents in that chart a

[1] While the 1917 curve runs much more smoothly in the $3,000 to $6,000 range than either the 1918 or 1919 curves, it is not without the hint of a bulge beginning at about $4,500. See p. 412.

[2] In constructing the complete income distribution curve for 1918, published in Volume I, the influence of changes in the accuracy of reporting around $5,000 income was probably overestimated.

TABLE 30A

Income intervals	Number of returns			Percentage increases		
	1917	1918	1919	1918 over 1917	1919 over 1918	1919 over 1917
$2,000–$3,000.....	838,707	1,496,878	1,569,741	78.47	4.87	87.16
3,000– 4,000.....	374,958	610,095	742,334	62.71	21.68	97.98
4,000– 5,000.....	185,805	322,241	438,154	73.43	35.97	135.81
5,000– 6,000.....	105,988	126,554	167,005	19.40	31.96	57.57
6,000– 7,000.....	64,010	79,152	109,674	23.66	38.56	71.34
7,000– 8,000.....	44,363	51,381	73,719	15.82	43.48	66.17
8,000– 9,000.....	31,769	35,117	50,486	10.54	43.77	58.92
9,000–10,000.....	24,536	27,152	37,967	10.66	39.83	54.74

similar appearance to 1918 though the absence of small intervals in the range immediately above $5,000 disguises the characteristics of the curve materially.[1]

The change in the contour of the lower range of the tax income frequency curve from 1917 to 1918 and 1919, is, as we have mentioned, associated with a large increase in the relative amount of income from wages and salaries in the lower intervals. Tables 30B and 30C are interesting in this connection.[2]

The 1916 figures in Table 30B are introduced simply because they are computable.[3] However, too much weight must not be attached to them. The 1916 returns are undoubtedly extremely inadequate. The high percentages that year from $3,000 income (the 1916 minimum) up to about $10,000 may possibly be the result of the ease with which *salary* returns (as opposed to *wage, business,* or other returns) are obtainable. The $4,000 to $5,000 interval is the lowest comparable interval for the four years.[4] In that interval the numbers of returns by years were:

1916– 72,027
1917–185,805
1918–322,241
1919–438,154

[1] When chart 28 was drawn for Volume I, only "preliminary" large interval data were available. Final small interval data show a "bulge" very similar to that seen in the 1918 line.

[2] The 1917 official *wages* figures include income from professions. The 1918 and 1919 *wages* figures do not. This makes the increase in the percentages in 1918 still more striking. Income from professions was tabulated separately in 1916, but was included in the *wages* figures for that year in order that 1916 and 1917 might be comparable.

[3] No data are available from which corresponding figures for 1913, 1914 or 1915 might be calculated.

[4] The $3,000–$4,000 interval did not in 1916, include married persons making a joint return.

TABLE 30B

PER CENT THAT INCOME FROM WAGES AND SALARIES IN EACH NET INCOME CLASS WAS OF TOTAL *NET* INCOME IN THAT CLASS

Income class	1916	1917	1918	1919
$ 1,000–$ 2,000			79.45	83.49
2,000– 3,000			69.75	74.53
3,000– 4,000	76.98		55.21	61.86
2,000– 4,000		46.32	(64.42)	(69.45)
4,000– 5,000	66.86	36.30	48.85	52.48
5,000– 10,000	53.31	36.16	39.59	43.24
10,000– 20,000	36.38	32.94	38.60	38.11
20,000– 40,000	24.60	26.82	33.16	33.38
40,000– 60,000	17.23	22.74	27.88	27.57
60,000– 80,000	16.20	19.67	25.36	24.01
80,000– 100,000	13.37	18.51	22.16	22.70
100,000– 150,000	13.34	15.75	18.44	18.75
150,000– 200,000	9.39	12.65	16.16	15.42
200,000– 250,000	9.14	12.30	13.07	13.62
250,000– 300,000	7.87	9.36	12.57	11.92
300,000– 500,000	6.59	10.17	11.27	10.18
500,000–1,000,000	5.21	6.39	5.42	6.80
1,000,000–1,500,000	4.84	2.83	7.54	1.60
1,500,000–2,000,000	3.23	3.76	2.21	10.00
2,000,000 and over	.51	2.39	.85	4.02

The amounts of income from wages and salaries and from other net income in the $4,000–$5,000 interval were year by year in millions of dollars:

	1916	1917	1918	1919
Wages and salaries [a]	216	301	703	1,029
Other net income	107	528	736	931

[a] Income from professions is included in the 1916 and 1917 wages and salaries figures.

The percentage changes in these items from one year to the next were:

	1917/1916	1918/1917	1919/1918
Wages and salaries	139.3	233.7	146.4
Other Net Income	493.0	139.4	126.6

It is plain that the great increase in the $4,000–$5,000 interval [1] in 1917 was in income from other sources than wages and salaries.

Table 30C shows the wage and salary figures compared with *total* income instead of *net* income as in Table 30B. It was, of course, necessary to retain the *net* income intervals as the data are not classified in *total* income

[1] As may be seen from Tables 30B and 30C, the increase from 1916 to 1917 in income from other sources than wages and salaries was greater than the increase in income from wages and salaries not only in the $4,000–$5,000 interval but also in the $5,000–$10,000 interval.

intervals. Though the relations between years are different in this table from what they are in the net income table,[1] the distribution of the percentages in each individual year shows much the same characteristics in both tables.

TABLE 30C

PER CENT THAT INCOME FROM WAGES AND SALARIES IN EACH NET INCOME CLASS WAS OF *TOTAL* INCOME IN THAT CLASS

Income class (Net)	1916	1917	1918	1919
$ 1,000– $2,000			74.67	77.25
2,000– 3,000			65.42	69.14
3,000– 4,000	47.74		51.14	56.71
2,000– 4,000		41.82	(60.15)	(64.12)
4,000– 5,000	45.96	33.60	44.82	47.12
5,000– 10,000	36.38	33.87	33.55	36.60
10,000– 20,000	25.76	30.89	33.10	32.70
20,000– 40,000	18.81	25.20	28.76	28.36
40,000– 60,000	13.75	21.23	23.79	23.39
60,000– 80,000	12.76	18.56	21.51	20.33
80,000– 100,000	10.74	17.61	19.00	19.25
100,000– 150,000	11.06	15.05	15.92	15.40
150,000– 200,000	7.68	12.01	13.10	12.41
200,000– 250,000	7.83	11.75	11.22	11.26
250,000– 300,000	6.64	8.71	10.73	9.80
300,000– 500,000	5.50	9.59	9.62	8.19
500,000–1,000,000	4.35	5.88	4.37	5.38
1,000,000–1,500,000	4.12	2.62	6.29	1.34
1,500,000–2,000,000	2.82	3.54	1.81	8.54
2,000,000 and over	.47	2.18	.63	.32

The percentages in Tables 30B and 30C show each year a sudden increase (as we approach the lower income intervals) somewhere in the $4,000 to $5,000 or the $5,000 to $10,000 interval. At *exactly* what point each year do these sudden increases seem to occur? Charts 30D, 30E and 30F present the material in a slightly different form. They illustrate the relationship between the average income from wages and salaries in each net income interval and the average total income in the same net income interval for the years 1917, 1918 and 1919 on a double log scale. The 1918 and 1919 charts immediately suggest the improbability of being able to describe the data by a single simple mathematical expression. To the 1918 data-points have been applied two distinct mathematical curves, which fit the data remarkably well and intersect at about $6,700 total income. The curve fitted to the upper income ranges is a parabola, while that fitted to the lower income ranges is an hyperbola, one of whose asymptotes is the 45° line which divides the chart into a "possible" and an "im-

[1] Some reasons for the changes in relation of *net* to *total* income f
mentioned on pages 401 and 402.

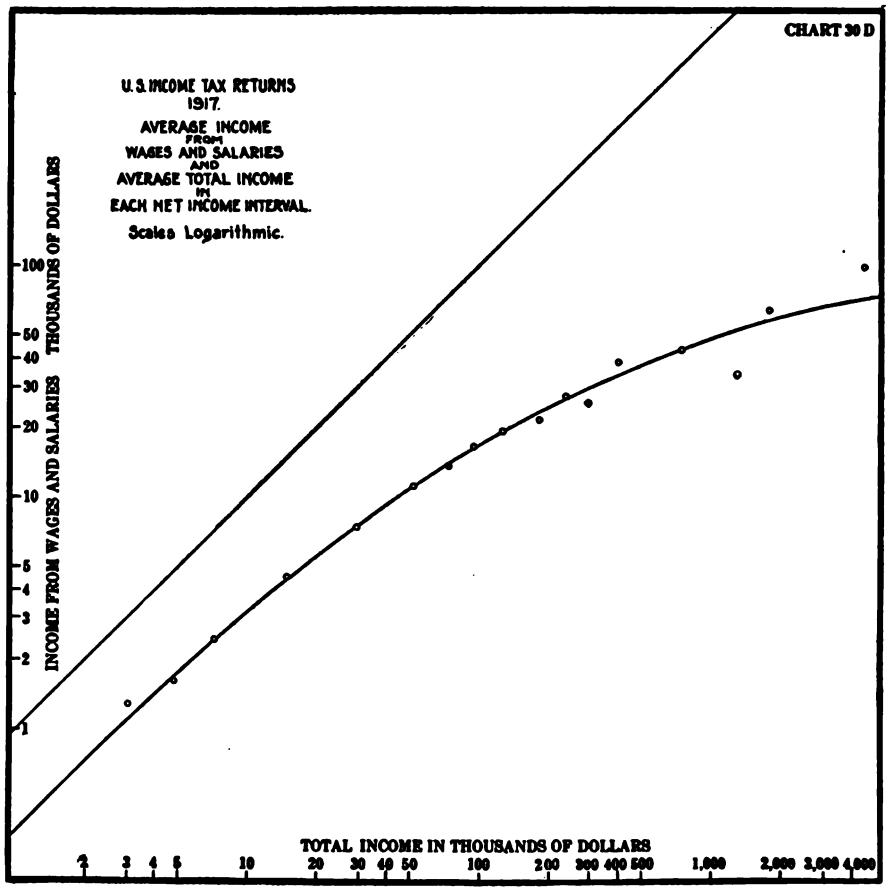


CHART 30 D
U.S. INCOME TAX RETURNS
1917.
AVERAGE INCOME
FROM
WAGES AND SALARIES
AND
AVERAGE TOTAL INCOME
IN
EACH NET INCOME INTERVAL.
Scales Logarithmic.
INCOME FROM WAGES AND SALARIES THOUSANDS OF DOLLARS
100
50
40
30
20
10
5
4
3
2
1
TOTAL INCOME IN THOUSANDS OF DOLLARS
2
3
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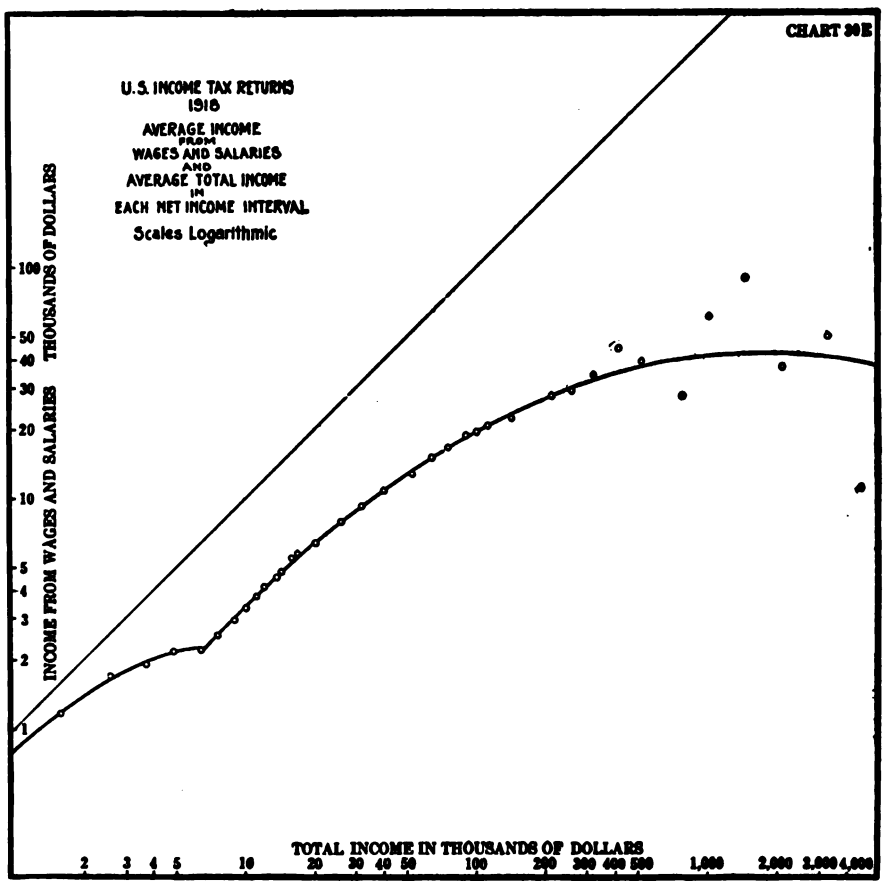
CHART 30E
U.S. INCOME TAX RETURNS
1918
AVERAGE INCOME
FROM
WAGES AND SALARIES
AND
AVERAGE TOTAL INCOME
IN
EACH NET INCOME INTERVAL
Scales Logarithmic
INCOME FROM WAGES AND SALARIES THOUSANDS OF DOLLARS
100
50
40
30
20
10
5
4
3
2
1
TOTAL INCOME IN THOUSANDS OF DOLLARS
2
3
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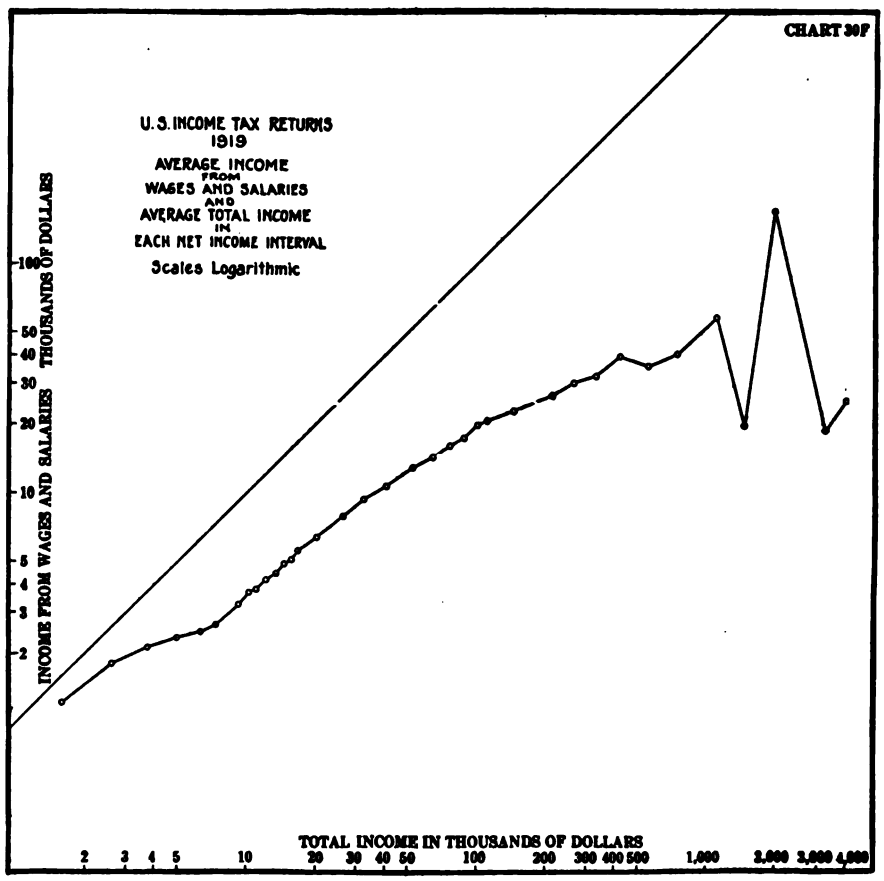


CHART 30F
U.S. INCOME TAX RETURNS
1919
AVERAGE INCOME
FROM
WAGES AND SALARIES
AND
AVERAGE TOTAL INCOME
IN
EACH NET INCOME INTERVAL
Scales Logarithmic
INCOME FROM WAGES AND SALARIES THOUSANDS OF DOLLARS
100
50
40
30
20
10
5
4
3
2
TOTAL INCOME IN THOUSANDS OF DOLLARS
2 3 4 5 10 20 30 40 50 100 200 300 400 500 1,000 2,000 3,000 4,000

possible" area. The equations of the two (1918) curves on a double log scale are (I) $y + 3.92945 - 2.744\,x + .22\,x^2 = 0$ (parabola)

(II) $y^2 - 3.981909\,y - .867246\,xy + 3.981909\,x - .132754\,x^2 - .060262 = 0$ (hyperbola)

As it is difficult to estimate accurately by eye the goodness of fit of a curve to data when charted on a log scale, Table 30E is introduced:

TABLE 30E

WAGES AND INCOME IN THE 1918 INCOME TAX RETURNS

Net income intervals (1918)	Average total income	Average income from wages and salaries		Percentages that data are of mathematical curves
		Data	Mathematical curves	
$ 1,000–$ 2,000	$ 1,566	$ 1,169	$ 1,178	99.2
2,000– 3,000	2,583	1,690	1,652	102.3
3,000– 4,000	3,710	1,897	1,955	97.0
4,000– 5,000	4,866	2,181	2,117	103.0
5,000– 6,000	6,388	2,192	2,216	98.9
6,000– 7,000	7,620	2,537	2,555	99.3
7,000– 8,000	8,952	2,963	3,012	98.4
8,000– 9,000	10,148	3,341	3,407	98.1
9,000– 10,000	11,214	3,747	3,760	99.7
10,000– 11,000	12,207	4,171	4,078	102.3
11,000– 12,000	13,707	4,555	4,542	100.3
12,000– 13,000	14,263	4,806	4,709	102.1
13,000– 14,000	15,922	5,529	5,204	106.2
14,000– 15,000	16,778	5,801	5,455	106.3
15,000– 20,000	20,167	6,375	6,400	99.6
20,000– 25,000	25,859	7,891	7,860	100.4
25,000– 30,000	31,704	9,196	9,211	99.8
30,000– 40,000	39,644	10,711	10,872	98.5
40,000– 50,000	52,319	12,639	13,192	95.8
50,000– 60,000	64,327	14,963	15,066	99.3
60,000– 70,000	74,848	16,576	16,539	100.2
70,000– 80,000	90,437	18,764	18,459	101.7
80,000– 90,000	98,379	19,273	19,351	99.6
90,000– 100,000	111,515	20,447	20,682	98.9
100,000– 150,000	139,520	22,212	23,163	95.9
150,000– 200,000	211,959	27,758	27,829	99.7
200,000– 250,000	259,487	29,107	30,068	96.8
250,000– 300,000	317,578	34,076	32,226	105.7
300,000– 400,000	409,756	44,393	34,786	127.6
400,000– 500,000	514,882	38,967	36,847	105.8
500,000– 750,000	765,905	27,582	39,765	69.4
750,000–1,000,000	1,013,846	61,183	41,229	148.4
1,000,000–1,500,000	1,426,182	89,710	42,199	212.6
1,500,000–2,000,000	2,084,715	37,118	42,199	88.0
2,000,000–3,000,000	3,263,673	50,178	40,729	123.2
3,000,000–4,000,000	4,515,732	11,013	38,753	28.4

The data of table 30E move rather erratically in the intervals above $300,000 per annum income. This is natural in view of the small number

of cases in these upper intervals. There were only 627 returns reporting net incomes of over $300,000 per annum; this is less than one seventieth of one per cent. of the total number of returns. In the 28 intervals under $300,000 per annum 14 of the percentages show the data within one and one half per cent. of the mathematical values.

These mathematical curves have not been introduced as being in any sense the "law" of the data but merely to emphasize how smoothly the data curves run and yet how unmistakable a sensation they give us of two parts, one above about $6,700 total income and one below that figure.[1] It would, of course, be quite impossible to get any sort of approximation to the lower range data by producing the parabola fitted to the upper income ranges. How impossible may be seen from Table 30EE.

TABLE 30EE

WAGES AND INCOME IN THE 1918 INCOME TAX RETURNS

Net income intervals (1918)	Average total income	Average income from wages and salaries			Percentages that data are of	
		Data	Hyperbola	Parabola	Hyperbola	Parabola
$4,000–$5,000.....	$4,866	$2,181	$2,117	$1,574	103.0	138.6
3,000– 4,000.....	3,710	1,897	1,955	1,152	97.0	164.7
2,000– 3,000.....	2,583	1,690	1,652	745	102.3	226.8
1,000– 2,000.....	1,566	1,169	1,178	391	99.2	299.0

The 1919 data show the same two-curve appearance as the 1918 data. This may be clearly seen from chart 30F.[2] The intersection of the two curves would be at about $7,100 instead of $6,700 as on the 1918 chart. Is there any sign of such a change from one curve to another on the 1917 data? There seems to be. Chart 30D shows the 1917 data with a parabola fitted to the observations above the first interval. This curve and Table 30D give us a strong impression that the first interval cannot be described by any simple curve which describes the remainder of the data. The same two-curve characteristics as the 1918 and 1919 data are strongly suggested.

The equation of the 1917 parabola on a double log scale is $y + 1.8417 - 1.8346\,x + .124\,x^2 = 0$. The poorness of the fit to the first interval and the comparative goodness of the fit to the remainder of the data as high as $250,000 per annum may be seen from Table 30D. If the data were numerous enough to permit us fitting two curves they would probably intersect at about $4,500.

[1] An alteration in the size of the intervals in which the data are quoted by the Income Tax Bureau would of course change the data curve to some extent. However, taking the intervals as they come and fitting the curves to them we get the unmistakable impression of great regularity. It seemed scarcely worth while to fit the curves to areas rather than points.

[2] The story told by Chart 30F is so plain it seemed hardly necessary to fit another set of curves.

TABLE 30D

WAGES AND INCOME IN THE 1917 INCOME TAX RETURNS

Net income intervals (1917)	Average total income	Average income from wages and salaries		Percentages that data are of mathematical curve
		Data	Mathematical curve	
$ 2,000–$ 4,000...	$ 3,059	$1,280	$1,101	116.3
4,000– 5,000...	4,818	1,619	1,688	95.9
5,000– 10,000...	7,210	2,442	2,422	100.8
10,000– 20,000...	14,623	4,517	4,374	103.3
20,000– 40,000...	29,236	7,368	7,411	99.4
40,000– 60,000...	51,940	11,024	11,038	99.9
60,000– 80,000...	72,811	13,516	13,699	98.7
80,000– 100,000...	93,742	16,510	15,992	103.2
100,000– 150,000...	126,979	19,108	19,081	100.1
150,000– 200,000...	181,156	21,758	23,147	94.0
200,000– 250,000...	233,880	27,501	26,388	104.2
250,000– 300,000...	293,905	25,587	29,478	86.8
300,000– 500,000...	398,517	38,204	33,877	112.8
500,000–1,000,000...	740,769	43,558	43,632	99.8
1,000,000–1,500,000...	1,294,619	33,973	52,845	64.3
1,500,000–2,000,000...	1,812,388	64,201	58,358	110.0
2,000,000 and over....	4,551,718	99,132	71,945	137.8

Both the regularity of the data curves and the positions of the intersections of the mathematical curves [1] might suggest that heterogeneity of the wages and salaries data was the primary cause of the irregularity in the total income curve. The position of the points of intersection of the mathematical curves might seem inconsistent with a sudden change in accuracy of reporting at exactly $5,000.

However this argument does not appear so conclusive when we examine the actual amount of wages in each income interval. The constitution of the reported income each year may be seen rather plainly in Charts 28T, 28U, 28V, 28W, 28X, 28Y, 28Z, and 28AA.[2] These charts show the number of dollars per dollar income interval reported in each income interval by sources for the years 1916 to 1919.[3] They not only illustrate the fact that the constitution of the income curve changes radically as we move from small to large incomes but also picture the salient characteristics of these changes; each source curve, being charted on a double log scale, may be

[1] Particularly the 1919 intersection which is above the $5,000 to $6,000 *net* income interval.

[2] See pages 385 to 392.

[3] The five lines representing wages, business, rents, interest, and dividends were found to interweave to such an extent when drawn on one chart that two charts were drawn for each year, one representing wages and business and the other incomes from property.

Wages includes "salaries, wages and commissions" and in 1916 and 1917 "professions and vocations."

Business includes "business," "partnerships, personal service corporations, estates, and trusts," and "profits from sales of real estate, stocks, bonds, etc.," and in 1918 and 1919 "professions."

Rents includes royalties.

Interest includes unclassified investment income.

seen at a glance in its entirety. We see from Charts 28X and 28Z that, though the ratio of the income from wages and salaries to total income may, when charted, show an angle above $5,000, the entire "bulge" on the wages and salaries curve itself occurs in the under-$5,000 intervals both in 1918 and 1919. Moreover, while "wages and salaries" is the largest item in these lowest income intervals, and hence is the controlling factor in determining the peculiar shape of the total curve in this region, it is not the only item showing irregularities and "bulges." Some of these movements are extremely difficult to explain. Why should a "bulge" appear on the lower income ranges of the "rent" curve in 1918 and by 1919 become pronounced? [1] The appearance of a bulge on the *wage* curves in 1918 and 1919 seems quite explicable on the basis of heterogeneity within the wage and salary data themselves but one feels a shade less confidence in any explanation of why that curve moved in this peculiar manner if the explanation does not seem also clearly applicable to the rents curve which moved in an apparently similar manner.

[1] A mere increase in rents will not, of course, account for this *unevenness* in their distribution.

CHAPTER 31

INCOME DISTRIBUTIONS FROM OTHER SOURCES THAN INCOME TAX RETURNS

Concerning the frequency distribution of incomes over $3,000 or $4,000 per annum we have almost no information aside from the income tax returns. Existing wage distributions and non-tax income distributions almost never reach higher than $2,500 or $3,000 per annum.

Even in the lower income ranges (under say $2,500 or $3,000) most of the existing non-tax income distributions are of little use in our problem. In the first place there are less than half a dozen distributions of this sort which are not such small samples as to prevent us feeling much confidence in their representative nature.[1] An even more serious defect of every such distribution known to us, with one exception[2] is that the purpose for which the data have been collected almost inevitably makes them extremely ill-adapted to our use. For example, one of the largest recent samples is prefaced by almost a page of introduction explaining what types of recipients were purposely excluded.[3] This is rather typical. To base upon such distributions any wide generalizations with respect to the income curve for the country as a whole or even for the localities from which such data were collected would be unwarranted.

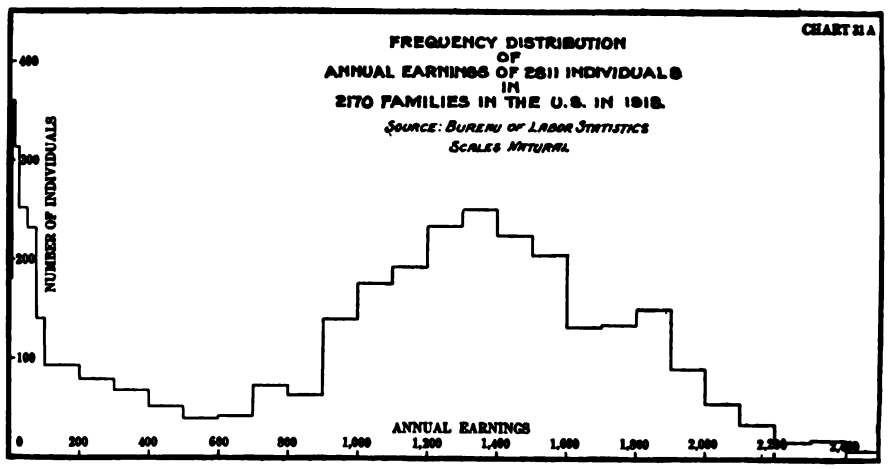
Furthermore, almost without exception these studies in *income* distribution are on a *family* basis. While it is sometimes possible to make a

[1] For example, Chapin's well-known investigation into the distribution of incomes includes only 391 workingmen's families, and the best distribution of farmers' incomes includes only 401 farmers from a single state.

[2] Arthur T. Emery's distribution of income among 1960 Chicago households.

[3] "In studying the sources of income and the importance of each source with relation to the total income of a family the following limitations to the type of family schedules should be kept in mind. No families were scheduled in which there were children who lived as boarders, that is, paid a certain sum per week or per month for board and spent the remainder of their earnings or salary as they saw fit. No families were scheduled which kept any boarders. The number of lodgers to be kept by a family was limited to three at any one time. No families were scheduled in which the total earnings of the family did not equal 75 per cent. or more of the total income. It will be seen that these limitations excluded a large number of families and this materially affects the percentage of families having earnings from children and income from lodgers, and also results in showing a larger percentage of the total income as coming from the earnings of the husband than would be the case if the type of families named had not been excluded from the study. It also reduces the actual amount per family earned by children and received from boarders or lodgers that would be shown in case a cross section of a community including all the types mentioned were used. The object in making the exclusions named was to secure families dependent for support, as largely as possible, upon the earnings of the husband. Of course, it was impracticable to secure a sufficient number of families in which the only source of income was the earnings of the husband, but in following the course named the percentage of families having an income from other sources has been very largely reduced." "Cost of Living in the United States—Family Incomes," *Monthly Labor Review*, Dec., 191[illegible]

rough estimate of the individual incomes from the family data, such estimates are not what are needed for our purposes. They can show nothing but the distribution of income among the individuals constituting these families and these families are almost inevitably so chosen as to make the individuals composing them not representative of income recipients at large. Analysis of the distribution of earnings among the individual members of such families discloses an heterogeneity so extreme as to result in a pronouncedly duomodal distribution curve. The fathers' incomes have one mode while the children's incomes have another. Chart 31A showing a natural scale frequency distribution of earnings among 2811 individuals in 2170 families in 1918 [1] exhibits this duomodal appearance in a striking manner. The "families" had been so chosen as to exclude both young



married couples having no children and unmarried but independent wage earners. Investigations planned to bring out the economic characteristics of such "typical families," while they may be extremely valuable for the purposes for which they were undertaken, are necessarily of but little use in the construction of a frequency distribution of all individual incomes in the community. Moreover, even if we were attempting to construct a family and not an individual distribution these data would not generally be particularly helpful for, in addition to the exclusions just mentioned, further narrow and rigid restrictions are usually, and for the purposes in view quite properly, imposed upon the definition of the "typical family."

[1] This is a sample from the 12,096 white families referred to in note 3, page 415 The detailed figures of this sample were tabulated for us by the Bureau of Labor Statistics. They cover 15 cities chosen as representative of the whole list. Each one of the 15 cities shows the duomodal appearance referred to in the text.

As incidentally remarked above, there is one non-tax income frequency distribution to which many of the above criticisms do not apply. It is the distribution of income among 1960 Chicago "households" in 1918 from an investigation made by Mr. Arthur T. Emery for the Chicago *Daily News*.[1] Instead of attempting to describe a "typical family" Mr. Emery attempted to discover the "household" income of each person whose name came at the top of a page in the Chicago city directory. Mr. Emery encountered many difficulties in attempting to follow out this scheme and has himself pointed out sources of error.[2] Notwithstanding the inevitable difficulties, Mr. Emery seems to have made a real effort to obtain a scientific sample. While his distribution shows unmistakable irregularities, it is in many respects for our purposes the most interesting and suggestive recent non-tax income distribution available.

Finally, it seems impossible to obtain from these distributions any but extremely general conclusions concerning the relation between income from effort and income from property. The data have almost always [3] been so chosen as to eliminate any families obtaining an appreciable fraction of their income from property. While they may give us some clues as to the shape of the upper range tail of the wage-earners' income distribution curve [4] they can tell us little about even the upper tail of the *general* income curve and almost nothing about the lower income tail of either the wage-earners' or the general income curve.

[1] While the Bureau is not at liberty to publish this material we were permitted to make what use we could of it in constructing our income curve for the country.

[2] In a letter to the Bureau he writes, "There was, however, one important source of error in this method—the poorer and middle class residents were willing to talk, and with the carefully trained approach of the investigator, the upper class was also won over, but we found in the wealthy districts that the butler and 'not at home' caused a large amount of travel on the part of the investigator," and often a final failure to obtain any report.

[3] These remarks do not apply to the distribution of income among the 401 farmers or Mr. Emery's distribution. However, the Bureau has no figures, in the case of Mr. Emery's distribution, for income from property.

[4] Compare pages 378, 379, 380.

CHAPTER 32

WAGE DISTRIBUTIONS

There is in all an immense amount of American wage data. On the other hand, as an investigator gets into his subject, he begins to realize that the material is more remarkable for its fragmentary nature than for its amount —great as that may be. For no recent year can he obtain wage distributions for more than about 8 per cent. of those gainfully employed. Of course, if these 8 per cent. were scattered over the different types of employment and localities in any truly random fashion, and if their wages were uniformly reported, much might be done with the material. As things are, however, whole occupations as important as agricultural labor and trade are almost unrepresented. Moreover, as we are interested in the amount of wages actually received during the year, it is rather discouraging to find that this is the one type of distribution which practically never occurs. Distributions of amounts actually earned in a month are almost as rare. There are a few distributions of amounts actually earned in a week or fortnight, but the great majority of wage distributions are distributions of wage *rates*—figures by the *hour* being the commonest—or of hypothetical earnings, generally known as full-time earnings per week.

Now it is in general impossible to construct a wage distribution for earnings from a distribution of rates. Earnings depend, of course, not only on rates but also on hours worked. However, we seldom know anything about the distribution of hours worked and almost never do we know anything about the relation between *rates* and hours worked. Chart 32A illustrates how violent may be the difference in shape of the *earnings* and *rates* curves for the same individuals.[1] The *earnings* distribution in this particular case shows not only a much greater scatter than the *rates* distribution but is of an entirely different shape, as may be seen from Chart 32B where the data are drawn on a double log scale. Chart 32C shows the distribution of hours worked in a week for the same individuals. Now, though the slaughtering and meat packing industry may be an extreme example, what evidence we have suggests that distributions of *rates* and of *earnings* are rarely in close agreement. Moreover the relation of the one distribution to the other changes as we pass from industry to industry.[2]

[1] 43,063 Male Employees in the Slaughtering and Meat Packing Industry in 1917. Bureau of Labor Statistics, *Bulletin 252*. For purposes of comparison the two distributions are so placed that the frequency curves show the same arithmetic means and areas.

[2] Resulting largely, of course, from the varying types of distributions of hours-worked-in-

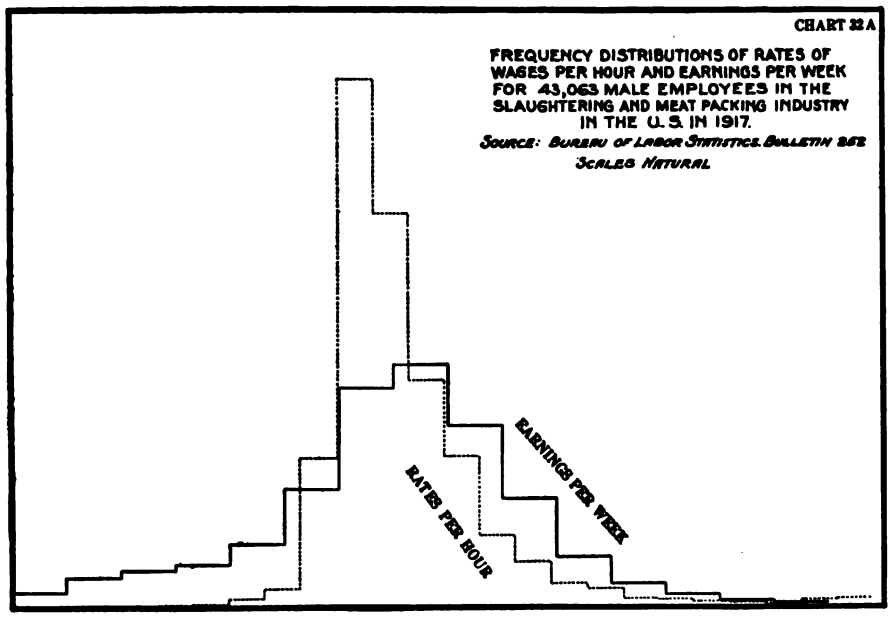


CHART 32A
FREQUENCY DISTRIBUTIONS OF RATES OF WAGES PER HOUR AND EARNINGS PER WEEK FOR 43,063 MALE EMPLOYEES IN THE SLAUGHTERING AND MEAT PACKING INDUSTRY IN THE U. S. IN 1917.
SOURCE: BUREAU OF LABOR STATISTICS. BULLETIN 252
SCALES NATURAL
EARNINGS PER WEEK
RATES PER HOUR

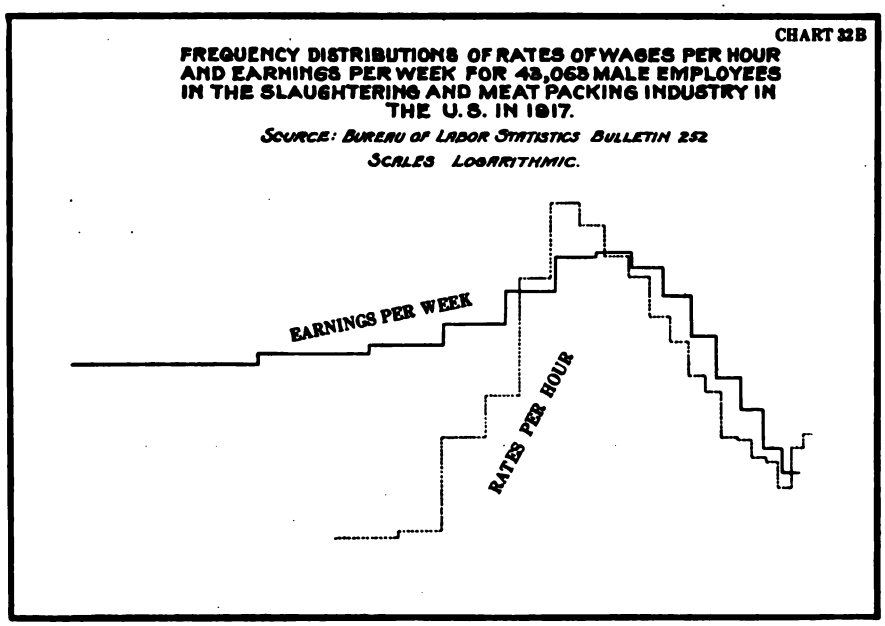
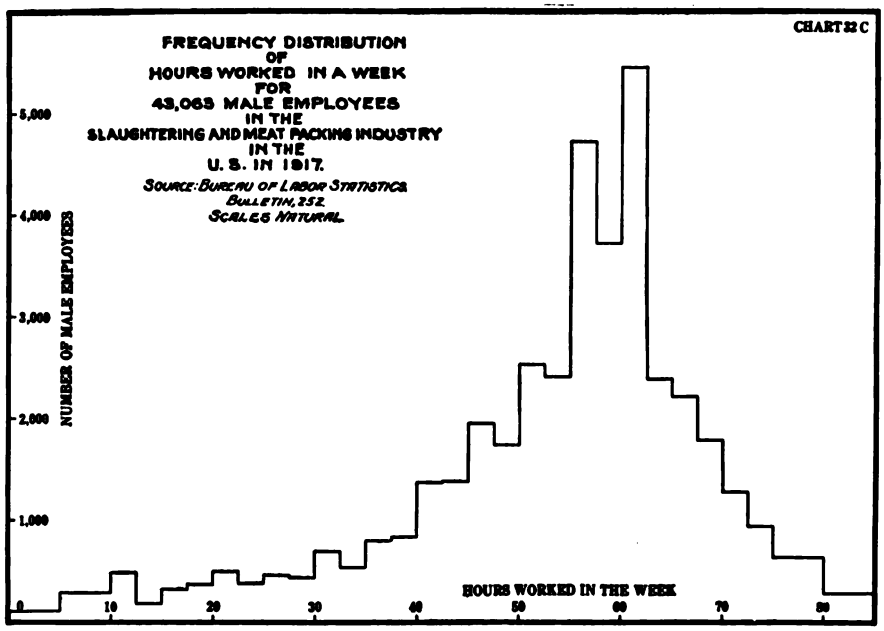


CHART 32B
FREQUENCY DISTRIBUTIONS OF RATES OF WAGES PER HOUR AND EARNINGS PER WEEK FOR 43,063 MALE EMPLOYEES IN THE SLAUGHTERING AND MEAT PACKING INDUSTRY IN THE U.S. IN 1917.
SOURCE: BUREAU OF LABOR STATISTICS BULLETIN 252
SCALES LOGARITHMIC.
EARNINGS PER WEEK
RATES PER HOUR



The same difficulty as we find in any attempt to estimate the distribution of earnings per week from the distribution of rates per hour seems inherent in any attempt to estimate the distribution of earnings in a year from the distribution of earnings in a week. The unknown distribution of weeks worked in the year must seriously affect our results.[1]

Estimating the frequency distribution of wages earned in a year for an industry from the frequency distribution of wages earned in another year in the same industry, if we had such data, would involve us in a similar difficulty. Even though we knew the total number of individuals gainfully employed and their total wage bill each year and also the frequency distribution of earnings for one of the years, estimating the frequency distribution for the other year would be hazardous. While some *rates* distributions for the same industry in the same locality show symptoms of not changing in shape very radically from year to year,[2] this does not seem

the-week (month or year) in different industries. Illustrations of lack of uniformity in the relation between rates and earnings of the same persons for the same period but in different industries were worked up from Professor Davis R. Dewey's Special Report on Employees and Wages for the 12th Census.

[1] We have no distributions of amounts earned in a week and in a year for the same industry, with which to illustrate this point directly.

[2] For example, the distribution curve for wages per week among Massachusetts factory workers shows a moderate degree of similarity of shape from year to year.

Professor H. L. Moore (*Political Science Quarterly*, vol. XXII, pp. 61–73) discussed the fluctuation from 1890 to 1900 in the variability of wage rates in a total made up of thirty

a sufficient reason for assuming the same of *earnings* distributions. The shape of the distribution representing hours or days worked in the year may be expected to change greatly from year to year with alternations of prosperity and depression.[1]

What little evidence we possess suggests that wage distributions [2] for individuals of the same sex in the same industry at the same date, but in different *localities*, though generally more dissimilar in shape than distributions for the same industry in the same place but at different *dates*, are less unlike one another than distributions for different *industries* though in the same place and at the same time. The variation in shape of such distributions for different industries is often extreme.[3]

selected manufacturing industries. These distributions (for 1890 and 1900) illustrate both the similarity and the difference in *rates* distributions between the two years.

[1] For example, what little information we have points to the "scatter" of the days-worked-in-a-year distribution being much greater in a year of depression than in a year of prosperity. The extreme variations in shape of the *income* distributions for the same 1240 individuals in the years 1914 to 1919 as seen in the *Statistics of Income*, 1919, page 30, are interesting in this connection.

[2] Whether earnings or rates.

[3] Examples of this are numerous. Charts 32D and 32E show the distribution of wages per week among Massachusetts males working in (a) the boot and shoe industry and (b) the paper and wood pulp industry. For purposes of comparison the two distributions are so placed on the natural scale chart that the frequency curves show the same arithmetic means and areas. The double log chart is based directly upon the natural scale chart. It was necessary to break up the "over $35" interval before calculating the arithmetic means.

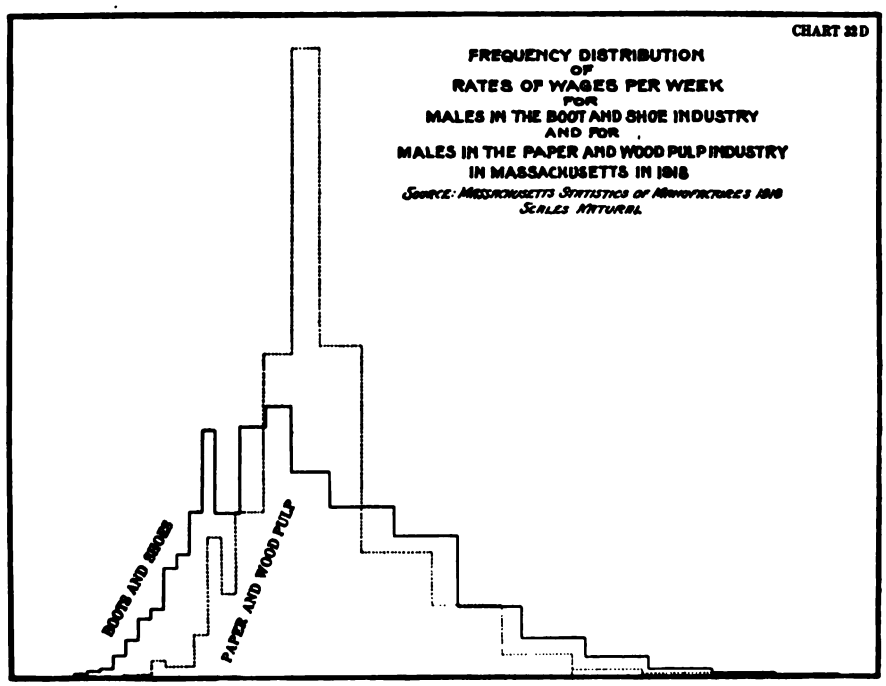
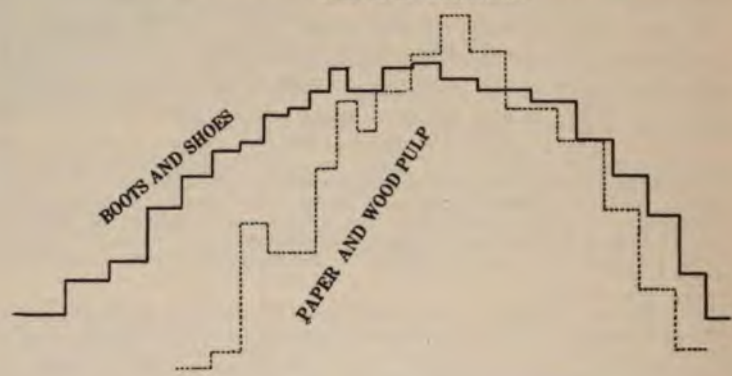


CHART 32E

FREQUENCY DISTRIBUTION OF RATES OF WAGES PER WEEK FOR MALES IN THE BOOT AND SHOE INDUSTRY AND FOR MALES IN THE PAPER AND WOOD PULP INDUSTRY IN MASSACHUSETTS IN 1918.

SOURCE. MASSACHUSETTS STATISTICS OF MANUFACTURES 1918.
SCALES LOGARITHMIC



In conclusion, the order of importance of the variables as affecting the shape of the distribution curve seems to be—industry, place, time.

We have but little basis for estimating total income from earnings. In the preceding chapter on Income Distributions from other Sources than Income Tax Returns attention was drawn to the difficulty of arriving at any reliable statement of relationship between earnings and income from such distributions because of the way in which the data were selected. It is even less possible to discover the nature of any such relationship from the income-tax material. Though there is no such apparent "selection" in the income-tax data as in the case of non-tax income distributions, the material is not arranged to answer our particular question.

The non-statistical reader examining Charts 30D, 30E and 30F, on which are plotted average total income and average income from wages in each income interval, might think that it would be quite simple to estimate the probable average total income of persons having any specified wage. However there is a profound statistical fallacy involved in the use of this material for any such purpose. As given in the official tables, income is the independent variable, wages the dependent. This condition cannot be reversed without retabulation of the original returns. The statistical student recognizes the problem as one involving the impossibility of deriving one regression line from the other when neither the nature of the

equation representing the regression line [1] nor the degree of relationship (correlation in the broad, non-linear sense) is known. Even if we knew that the average *net income* of those persons reporting in 1918 in the $5,000 to $6,000 net income class was $5,474 and the average *wage* obtained by these persons was $2,192, we would be quite unwarranted in concluding that the average *income* of persons receiving $2,192 per annum *wages* was $5,474. If no wage earner received income from any other source than wages we still would have a condition where the average *income* in the income class would be greater than the average *wage*. Total wages would be necessarily less than total income, because in the income class are included not only wage earners but capitalists and entrepreneurs. But both total wages and total income are divided by the same number to get an average—namely total number of persons in that income class.

This suggests a technical criticism of the material contained in the *Statistics of Income*. All data concerning the relation between two variables are always there published in such a manner as to give information concerning only one of the regression lines and no information whatever concerning the "scatter." If such data were published in the form of "correlation tables" the increase in usefulness for statistical analysis would be very great. Such "correlation tables" keep closer to the original data than the usual type of statistical tables. Freer use of them is much to be desired, particularly in cases where it is difficult to anticipate all the problems for whose solutions investigators will go to the tabulated materials.

[1] The difficulty of the problem is, if possible, increased in this particular case because of the fact that the regression is radically non-linear.

CHAPTER 33

THE CONSTRUCTION OF A FREQUENCY CURVE FOR ALL INCOME RECIPIENTS

The direct and only adequate method of discovering what is the frequency distribution of income in the United States would be to define very carefully the terms *income* and *income recipient* and then have a carefully planned census taken by expert enumerators upon the basis of these definitions. The returns brought in by the enumerators should moreover be sworn to by the persons making them and heavy penalties attached to the making of false or inaccurate returns. A less satisfactory method but one which would probably give excellent results would be to have a large number of truly random samples taken by such a census. The results of either procedure could then be adjusted in the light of other statistical information concerning the National Income and also in the light of theoretical conclusions derived from the data themselves.

Constructing an income frequency distribution for all income recipients in the United States from the existing data, a few of whose peculiarities have been noted in the preceding chapters, necessarily involves an extremely large amount of pure guessing. It is only because of the practical value of even the roughest kind of an estimate that any statistician would think of attacking the problem. The method followed in the actual construction of the income frequency distribution has been outlined in volume I.[1] This method contains one assumption after another that is open to question. Moreover we feel in many cases quite unable to estimate the probable errors involved in these assumptions. Their only excuse is their necessity. What is the amount of under-reporting for income tax and how is it distributed? What is the effect upon the returns of "legal evasion?" To what extent is the "bulge" on the income-tax returns in the region under about $5,000 in 1918 the result of the "intensive drive?" What is the relation between wages and total income by wage intervals? What is the relation between wage rates and earnings in any particular industry? Etc., etc. These are all questions which must be answered over and over again and yet they are questions the answers to which must be, in many instances, almost pure guesses. And, to repeat, the margin of possible error is often large.

In view of the sparsity and inadequacy of the data, our first approach to the problem was an attempt to discover, if possible, some general mathematical law for the distribution of income. Were we to get any very defin-

[1] *Income in the United States*, Vol. I, pp. 122–139.

ite and reliable clues as to the mathematical nature of the frequency distribution of income from small sample income distributions and from wages distributions, etc., such clues might of course be invaluable in checking the results obtained from piecing together existing wage distributions, income distributions, and other scattered information. We would be in the position of the astronomer who is able to "adjust" the results of his observations in the light of some known mathematical law. It soon became clear, however, that it is quite impossible to discover any essential peculiarities of the income frequency distribution. The available material is not only insufficient for purposes of such generalizations, but moreover the distribution from year to year is so dissimilar, that any generalization of this nature is too vague to be of any practical value.

The method finally used for the construction of the income curve has therefore, we are sorry to say, practically all the weaknesses of the data from which it has been constructed. The occupations of the country were tabulated and to each occupation was assigned those wage and income distributions which seemed applicable with the least strain. We had then a series of income and wage distributions which nominally covered nearly all the income recipients in the United States, though for some occupations the inadequacy of the wage and income samples was little short of absurd. The wage distributions were converted into income distributions on the assumption that the smaller the wage the larger is its percentage of total income. Beyond this simple assumption the particular functional relationships used for many industries were almost pure guess work. Moreover, not only was there the danger of error in moving from wage distribution to income distribution and the danger of error resulting from estimating a wage distribution for a particular industry in a particular locality from a similar though not identical industry in a different locality, but also there was the danger of error resulting from estimating a wage distribution for one year from a wage distribution for another.

The final results are probably not quite so bad as they might have been had we not had a number of collateral estimates with which roughly to check up and otherwise adjust the first results of our estimates. For example, such independent information as Mr. King's estimate of the total income of the country and Mr. Knauth's estimate of the total amount of income from dividends were pieces of information with which the results of the frequency curve calculations were made to agree.

Some hypothetical reasoning is inevitable in such a statistical study as the present one. The investigator must not lose heart. Sir Thomas Browne in his rolling periods sagely remarks that "what song the Syrens sang, or what name Achilles assumed when he hid himself among women, though puzzling questions, are not beyond all conjecture!"

INDEX

"Actually at work," 178, 272
  differs from "attached to industry," 33–34
Actual savings, in corporate surplus, 329
Agricultural implements, 52–54
Agricultural laborers
  age and sex percentages, 279
  income of, 270
  wages of, 55–59
  winter earnings in other industries, 290
Agricultural products, total
  gross value of, 299–301
  net value of, 55
Agriculture, 40–64
  relative importance, 62
American Contractor, 103
American Merchant Marine
  see transportation by water
American Telephone and Telegraph Company, 179–190, 335
Ammain
  average income per, 233–234, 342
  defined, 233
  number of, 234
Animal products
  aggregate value, 49, 60, 303–304
  variations in value, 48
Animals on farms
  see live stock on farms
Animals slaughtered, 42
  value of, 302–303
Animals sold
  value of, 302–303
Army, Navy, and Marines, 212 [illegible]
  average annual income over [illegible]
  average annual income under [illegible] 254
  number employed in, [illegible]
"Attached to the industry"
  meaning of term, 34, [illegible]
  numbers, [illegible], 272
Australian war census of incomes, [illegible] 395–400

Automobile Chamber of Commerce, National, 52
Automobile repairing
  see hand trades
Automobiles on farms, 52–54

Banking, 202–209
  entrepreneurs normally occupied in, 33
  volume of business, average, 209
  see also deposits, bank
Barrett, Alfred M., 150–152
Bartlett, D. P., 369
Bell Telephone Companies, 179–190
Birth rates, 14–16
Blacksmithing
  see hand trades
Bond Buyer, 261
Bondholders
  see security holders
Bond interest
  see security holders, share of, interest on investments
Bonds, conversion, 265
Bonds, Liberty, 12, 219
Bonds, Postal Savings, 265
Bonds, U. S., 265
Book income
  defined, [illegible]
  used in first estimates, 10
Bowley, A. L., [illegible]
[illegible]
[illegible]
[illegible]
  [illegible]
[illegible]
[illegible]
  [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
  [illegible]
[illegible]

Bureau of Labor Statistics
data used in price index, 17–24, 43, 113
index of residence rents, 91
Union Scale of Wages and Hours of Labor, 147, 198
Bureau of Mines, U. S.
data from, 65–77
Business savings
see savings, business

Cabinet making
see hand trades
Car days
Pullman, in relation to employees, 138–139
street, 155
Car miles
Pullman, 140
street railway, 155–156
Carpenters, 107
Census of
Agriculture, 33, 230
Central Electric Light and Power Stations, 157
Electrical Industries, 33
Electric Railways, 149
Incomes, 395–400
Manufactures, 33, 83, 109, 273–274
Mines and Quarries, 73, 74, 273
Occupations, 32–33, 210, 271, 273
Religious Bodies, 275
Telephones, 59, 180, 183
Transportation by Water, 196, 198–200
Wealth, Debt and Taxation, 211–217, 219, 230
Changes in income tax law
see income tax law, changes in
Chapin, R. C., 292, 379, 415
City and village government, 210–217
Civil service, 210–217
Clerical occupations
average annual incomes under $2,000, 285, 288
average wages, 277
number engaged in, 276, 277, 283, 284
age and sex percentages, 280
Clock repairing
see hand trades
Coal industry
see mines, quarries and oil wells
Commercial failures, 325
Commissioner of Education, U. S.
annual reports of, 212
Commissions to Express employees, 143–144
Common carriers
see Pullman cars, steam railways, street railways, transportation, transportation by water
Comptroller of the Currency
annual reports, data from, 202–209
Consols of 1930, U. S., 265
Construction costs, index of, 69, 335–336
electric light and power, 164
manufacturing, 96
street railways, 154
Construction industry, 103–115
indices of profits, wages, material prices, 108
Construction work, value of in U. S., 104–106, 109–111, 114–115
Consumption goods
comparison of price indices, 31
index of prices of,
for well-to-do, 24–30
for workers, 17–24
interest on value of, 229–232
value of, in agriculture, 302–304
Contract work in manufacturing, 86, 89
Corporate earnings
all corporations, 324
having net incomes, 324
compared for decade, 326
electric light and power, 159–160
manufacturing, 85
proportion to dividend and surplus, 327
railways, 127
transportation by water, 192–194
Corporate savings
see business savings
Corporate securities, total, held by banks, 203
Corporate surplus
see surplus, corporate, also savings, business
Corporations, number of
reporting no income or deficit, 325
reporting taxable income, 326
Cost of living
see cost of consumption goods, also price indices, etc.
County governments, 213–216

Cow-keeping, 230–232
Cows on farms, 43–44
Crops
  fed and not fed to live stock, 50–51
  value of, 54–55, 60, 301–305
Curves, fitting
  abuse of power series in, 375
  to cumulative data dangerous, 363
  to different functions of the variable, effect of, 347

Dairy products, 42–44
Day, Edmund E., 75–77, 300
Death rates, 14–17
Debts, public, interest on, 216, 219
Deficits, corporate, 324
  amount of, 325
Deposits, bank, average volume of, 209
  compared with population, 207–208
  share of net value product, 206–207
Depreciation
  manufacturing, 84–86
  railways, 119
Dewey, Davis R., 372, 378, 420
Direct goods
  see consumption goods
Disbursements
  by Government to employees, 214
  net, how ascertained, 3
  net vs. gross, 3
Disbursements, net, to entrepreneurs and other property owners
  construction, 108
  electric light and power, 163
  express, 141–143
  government, 217, 219
  manufacturing, 92–94, 96
  mining, etc., 66–70
  Pullman transportation, 136
  railways, 125, 127
  street railways, 148, 151–152, 155
  telegraphs, 168–169, 171–174
  telephones, 181–183
  transportation, 116
  transportation by water, 195, 196
Disbursements, total, to entrepreneurs, 238–239
Discounts, bank, 203
Distribution of income
  see frequency distributions

Dividends
  banking, 202–205
  corporate, 324, 328
    total, 382
  electric light and power, 164–165
  manufacturing, 95–96
  mining, etc., 67–69
  net vs. gross
    banking, 202
    express, 142
    Pullman transportation, 134
    telegraphs, 170–172
  Pullman transportation, 133–135
  share of, in earnings, 327
  street railways, 151–154
  telegraphs, 168–173
  telephones, 179–182
  total, 328
  transportation by water, 193–194
Dodge, F. W., Company, 103–105
Domestic animals, 42
Dressmaking, custom
  see hand trades
Drury, H. B., *Marine and Dock Labor*, 197
Dun's Review, 325
Dyeing and Cleaning
  see hand trades

Earnings
  average annual
    how computed, 33–35
    of persons receiving under $2,000, 285
    vs. rates of pay, 271
    vs. wage rates, 12
  average "full time," 34–38
    of farm laborers, 289–290
  see also employees, share of
Earnings, corporate
  see corporate earnings
Earnings, gross
  of transportation by water concerns, estimated, 193
  of farms and farm families, 302
Earnings, net of
  all corporations, 324, 327, 328
    having net incomes, 324
  farmers, 302
  manufacturing corporations, 93, 96
  proportion of dividend and surplus, 327
Earnings, personal, 269
  and total income, 382 392, 406–414

Earnings, personal, (cont.)
how estimated, 271–279
income from, 270
of individuals in a family, 416
see wages, frequency distributions, heterogeneity of income data
Edgeworth, F. Y., 349, 375
Edison Company, The New York, data used for price index, 20
Efficiency of employees
see physical products
Eggs and poultry, 45–46
Electric light and power companies, private, 157–167
Electric railways
see street and electric railways
Emery, Arthur T., 379, 415, 417
Employed persons, gainfully, in U. S.
see persons gainfully employed
also employees, and occupational distribution
Employees, average annual earnings of
agriculture, 57–58
banking, 206
construction, 114
electric light and power, 166
express companies, 147
government, 214–215
manufactures, 91
mines, etc., 74–76
Pullman car transportation, 137–138
steam railways, 131
street and electric railways, 152–153
telegraph companies, 169
telephone companies, 185–186
transportation, 118
transportation by water, 196–197, 199–200
unclassified industries, 224
see also employees, share of
Employees
"actually at work" differs from "attached to industry," 33–34
"attached to industry," meaning of term, 33–34
numbers, 38
damages paid to, by railways, 125–126
occupational distribution of, 32–39, 280
output per capita, *see* physical product, 125–126
Employees, number of
agriculture, 57
banking, 205–206
construction, 114
electric light and power, 166
express companies, 146–147
government, 210–212
hand trades, 102
manufactures, 90–91
mines, quarries and oil wells, 73–74
percentage by ages, sexes, industri 279
Pullman cars, 138–139
steam railways, 128–131
street railways, 153
telegraphs, 175, 177
telephones, 184–186
transportation, 118
transportation by water, 196–198
unclassified, 224
Employees, share of
agriculture, 55–56, 289–290
all industries, 243
banking, 205–207
construction, 105–109, 113
electric light and power, 158, 161, 16 166, 242
estimated, 161
express companies, 144–147
Government (all branches), 212–21 220
hand trades, 100, 102
manufactures, 87–90, 98
mining, etc., 70–75
Pullman cars, 136–138
railways, 125, 127, 128, 131
street railways, 151, 153–154
telegraphs, 169, 175
telephones, 183–186
transportation, 117
transportation by water, 195–200
unclassified industries, 223–224, 232
Entrepreneurs
how defined, 32
industrial distribution of, 33
Entrepreneurs and other property owners
disbursements to
see disbursements
purchasing power of share of, in
agriculture, 59–61, 63
banking, 205

Entrepreneurs, etc. (cont.)
purchasing power of share of, in (cont.)
construction, 111–112
electric light and power, 164
express, 143
manufacturing, 97
mining, etc., 70
Pullman cars, 135
railways, 132
street railways, 153–154
telegraphs, 174
telephones, 182
transportation, 116
transportation by water, 194–195
unclassified industries, 227
Entrepreneurs share in the net value product of
agriculture, 59
all industries, 240–241
banking, 204–205
construction, 107–112
electric light and power, 165
express, 142–143
manufacturing, 91–98
mining, etc., 65–70
saved as surplus, 68
Pullman transportation, 134
railways, 123, 127
street railways, 150–151
saved as surplus, 152
telegraphs, 173–174
telephones, 179–180
transportation, 116
transportation by water, 193–195
unclassified industries, 225–228
Errors in computations, minor, 7
Errors of estimates, 7–10, 230, 251, 255, 273
probable error, 330–332
Estimates of income
from industrial products, 4
how made, 3
made from corporation reports, 4
plan of presenting, 10
Excess profits tax, 320
Excise taxes, corporate, 324
Expenses of farmers
relative increase, 307
total, 302–303
Express companies, 141–147
Factory production
see manufacturing industry
Failures, commercial, 325
"Failure to report" incomes, 254–260
Farm employees
see agricultural laborers
Farm laborers
see agricultural laborers
Farmers
distributed by income, 308–309
expenditures of, 302–307
families, 337
not "gainfully employed," 32, 289
income of, 298–313
percentages, 333–335
receiving over $2,000, 253, 313
receiving under $2,000, 270, 313
total, 307, 311–312
income tax, 299
"labor income" of, 308–310
number of, income over $2,000, 253
returns to, 62–64
tenant, 305
Farm property
rental value of, 309–310
value of, 54–55, 298–299
Farm loans, Federal
interest on, 261
outstanding, total, 264–265
Farm products
see agricultural products
Farms, number of, 300
Federal Bureaus
see bureaus
Federal Government, 210–222
Federal Reserve Board
study of employees' income apportionment, 25
Federal securities held by banks, 218
Fertilizer, 52, 54
Finance
proportion of dividends and surplus, 327
Financial Statistics of Cities, 213, 215, 217, 219, 291
Financial Statistics of States, 211, 212, 219, 291
Fire department
see police and fire departments
Flux, A. W., 348
Food and kindred products, 80–82
see also agriculture

Freight carried by railways, 128–130
Frequency curves
describing distribution of income by, 343
normal curve of error
fitted to heights of men, 347
not applicable to income distributions, 346–348
rejected by Pareto, 346
Pearson's system of, 348, 375
$y = bx^m$, 368–369, *see* Pareto's Law
see hyperbola
Frequency distributions
of heights of men, 347
of income, 339–425
among families, 341
among individuals, 341, 416
among wage-earners, tail-slope of, 379–380
by sources, 385–392
equations of straight lines fitted to, 367
factorial, 341
heterogeneity of data, 376–393
in U. S., 350–362, 365–368, 382–392, 400, 404–414, 424–425
tax returns *1914*, 351, 357; *1915*, 352, 358; *1916*, 353, 359; *1917*, 354, 360; *1918*, 355, 361; *1919*, 356, 362; *1915* and *1918* compared, 365–367; $5,000-line, 403–404
in Oldenburg, 363–364
mathematically describing, 343
meaning of similarity in, 375
not describable by normal curve, 346–348
per ammain, 341
of wages, 369–374, 378, 416–423
and incomes, 380–392, 405–414
peculiarities of, 418–423
per hour, 370–374
rates and earnings in same industry, 419
rates in different industries, 421–422
similar tail-slopes of dissimilar, 371–374
tail-slopes of various, 378
tail-slope not an index of scatter, 373
see hyperbola, Pareto's Law
Friday, David, 316, 321, 326, 328
Funk, W. C., 301

Gainfully employed persons in U. S.
age and sex of, 279
see also persons gainfully employed, employees, and occupational distribution
Gardens, 50–51
Gini, C., 349
Goldenweiser, E. A., 300, 302, 303, 304
Government in U. S.
data concerning all branches of, 210–222
income from
principles determining, 4–5
number of employees of, 212
Government service to business
impossible to measure, 5
Government services,
direct; indirect, 5
Grist mills, custom
see hand trades
Gross earnings
see earnings, gross
Gross income
see earnings, gross
also income, gross
Gross value of products in
agriculture, 299–301
manufacturing, 78–84
Gross wealth
see wealth, gross

Hand trades, 99–102
Harness and saddles, 52–54
Hart, Hornell N.
Fluctuation in Unemployment in Cities of the United States, 36
Heterogeneity of income data, 376–393
see frequency distributions
Hod carriers, 107
Homes owned, 291, 294
income from 270
rental value of, 228–229
tax exempt, 261, 267–268
Honey, value of, 49
Horses, value of, 48, 53
House rents
index of, 294
value of, 302
Housewives
value of services excluded, 249
Hoyt, Homer, 104

Hyperbola
  fitted to earnings per hour, 370–371
  logarithmic frequency curves describable by, 369

Immigration
  annual statistics of, 14–16
Income
  amount subject to taxation, 259–260
  book, 3
  defined, 3, 341
  failure to report, 254–260
  from Government, how computed, 5–6
  how estimated, 3, 250–252
  interest on loans not deducted, 12
  miscellaneous, 223–232
  monetary vs. non-monetary, 341
  non-monetary, 298
  per ammain, 233–234, 342
  psychic, defined, 3
  reported for tax, 253
  spurious, due to changing prices, 249–250
  total bank vs. bank loans, 209
  understatement of, 254–260
Income average
  annual, per capita, 337
  from wages and salaries, 408–414
  per ammain, 233–234
  persons receiving over $2,000, 258
  persons receiving under $2,000, 285–288
Income, corporate
  total reported, 324
Income, farmers, 298–313
  based on average ratio of expenses to total product, 305–308
  based on sample incomes, 308–310
  based on total production and expenses, 300–305
  final estimates, 310–313
  over $2,000, 313
  percentage of total average incomes, 381
  total, 382
  under $2,000, 313
Income, gross
  electric light and power, 158
  express companies, 143
  farmers, 303, 307, 311–323
  manufacturing, 85
  of persons receiving over $2,000, 253, 384
Income, gross (cont.)
  of persons receiving under $2,000, 279
  related to personal earnings, 295–296, 382
  street railways, 149–150
  transportation by water, 192–193
Income, National
  distribution of expenditures, 336
  percentage of, received by persons
    comprising the highest five per cent, 333–334
    farmers, 333, 335
    receiving over $2,000, 332–333
    receiving under $2,000, 332–333
    purchasing power of, 333, 335, 337
    range of, 330, 332
    total, 331
Income, net
  all corporations, 324
  all farmers, 303, 307
  industrial, 4
  personal by sources, 382–392
  salaries vs. business, 257
  surplus included in percentage going for shelter, 292
Income, personal
  defined, 341–343
  from pensions, 270
  negative, 347–348
  returns by sources, 382–392
Income, personal distribution of, 339–425
  see frequency distributions, heterogeneity of income data, Pareto's Law
Income, personal, over $2,000, 253 268, 331
  average, 258
  from business, 267
  from salaries, 267
  price index for, 140
  total, 141
Income, personal, under $2,000, 260 297
  from investments, 291 297
  occupations and industries, 171 280
  personal earnings, 260 291
    related to total income, 295
  price index for, 140
  total, 270 331
Income receivers, classes of, 340
  defined, 342
  frequency curves for, 151 159

Income tax
corporate, 324
data used to estimate income, 253–257, 295
law, administration of, 254
changes in, affecting comparison, 254–320
Income, tax exempt from, 260–268
Federal farm loans, 261, 264–265
Government bonds, 261, 265
Liberty bonds, 261, 263–264
obligations of possessions of U. S., 261
rental of owned houses, 261, 267–268
state and local debts, 261–262
through nature of occupation, 261, 266–267
Income tax returns
accuracy of reporting, 402–414, 424–425
and frequency distribution, 351–362, 365–368
comparison for years 1915 and 1918, 365–369
farmers, 299
for different classes, 383–392
importance in estimating income distribution, 401–414
number of, 385
on uniform exemption limit, 256
technique of, 401–403
Index of gross output in manufacturing, 80–83
Index of prices
business savings, 11
construction, 334, 336
consumption goods
used by well-to-do, 24–31, 333, 334, 336
used by workers, 17–24, 31, 333, 334, 336
farm products on farm, 307
farm products at market, 307
house rents, 294
placed on 1913 basis, 11
war expenditures, 334, 336
Index of wages, 279
Industrial Conference Board, National, 293
indices of prices, 20–23
Industrial distribution
of gainfully employed persons, 31–39
of persons receiving under $2,000, 271–286
Influenza
effect on population, 16–17
Information
additional, available, 10
Ingalls, W. R., 68, 310, 321
Insurance, cost to farmers, 53–54
Inter-business payments, elimination of, 4
Interest
fraction of total income received from, 386–392
on investments in
agriculture, 52–54, 302
electric light and power, 162–164
express companies, 141–142
manufactures, 85, 93, 96–97
mining, etc., 66–67
railways, 123
street railways, 150, 151–154
telegraphs, 170–172
telephones, 180–182
transportation by water, 193–195
unclassified industries, 229–231
on local debt, 261–262
paid by Government, 216–219
payments on consumption loans
not deducted from income, 12
tax exempt, 261
Investments, income from, 270
of persons receiving less than $2,000, 294–297
Iron and Steel, 80

Jewelry
see hand trades

Kansas Bureau of Mines, 71
Kapteyn, J. C., 349
Kilowatt hours produced by electric light and power companies, 167
Knibbs, G. H., 395

"Labor income" of farmers
average, 310
defined, 308
estimated, 309
Laidler, H. W., 74
Laundries
accuracy of data on, 99
see also hand trades
Leather and its products, 81
Liabilities of failures, total, 325

Liberty loans
see loans, Liberty
Lincoln, Professor Edmond E., 158
Lipka, J., 369
Liquors and beverages, 81
Live stock on farms, 47–49
value of, 302
Loans, bank
average volume of, 209
compared with population, 207–209
made to farmers, 53–54
purchasing power of, 208–209
Loans, consumption
interest payments on, 12
Loans, Federal farm
see farm loans, Federal
Loans, Liberty
effect on Government interest payments, 219
income computed from, 12
interest on, 261, 264
value of, 263
Loans of 1925, U. S., 265
Loans, Panama Canal, 265
Local debt
interest on, 261, 262
Lock repairing
see hand trades
Lumber, 80

Mackay telegraph companies, the, 168–178
Manufacturing Industry, 78–98
approximate total business savings in, 236–237
gross value of output vs. net value product, 78–84
importance of industry, 78
number engaged in, 273–274, 280, 283, 284
age and sex percentages, 279
average annual incomes under $2,000, 285, 288
proportion of dividend and surplus, 327
sources of information, 78–83
statistics of
Massachusetts, 36–37, 80–82, 87–88
Pennsylvania, 71, 87–88, 106
March, Lucien, 349
Marines
see Army, Navy and Marines
Massachusetts
Statistics of Manufactures, 36–37, 80–82, 87–88
Meat supply of U. S., 42
Merchant Marine, American
see transportation by water
Metals other than iron, 82
see also mines, quarries, and oil wells
Michigan Department of Labor, 71
Milk supply, 43–44
Millinery
see hand trades
Mines, quarries, and oil wells, 65–77
Mining
entrepreneurs normally occupied in, 33
number engaged in, 273, 280, 283, 284
age and sex percentages, 279
average annual incomes under $2,000, 285, 288
sources of information, 65
Moore, Henry L., 349, 420
Morman, James B., 305
Mortgages on farms, 305
Municipal utilities, 211–218

National income
see income, national
Navy
see Army, Navy and Marines
Need unit of income, 342
Net earnings
see earnings, net
Net value product
see value product, net
New York Journal of Commerce, 327
N. Y. State Civil Service Commission, 212
Non-monetary income, 298

Ocean cables
see telegraphs
Occupational distribution of
employees, 32–39
entrepreneurs, 33
persons receiving under $2,000, 271-286
Oil wells
see mines, quarries and oil wells
Output
see physical product

Painters, 107
Panama Canal loans, U. S.,
see loans, Panama Canal

Paper and printing, 81
Pareto, Vilfredo, 344
  non-mathematical conception of chance, 348
  rejects negative incomes, 346
  rejects normal curve, 346
Pareto's Law, 344–394
  any general income "law" questionable, 374–392
  conclusions concerning, 393–394
  described, 344–345
  impossibility of extrapolating, 345
  lower income ranges and, 368–374
  modern substitute for Wages Fund Doctrine, 345
  non-rectilinear forms of, 348
  straight line hypothesis, 349–363
  uniformity of slope thesis, 363–368
  zero mode with infinite ordinate, 345
  see frequency distributions, heterogeneity of income data, hyperbola, income, personal distribution of
Passenger traffic on railways, 128–130
Paving materials, 82
Pearson, Karl, 348, 349, 369
Pennsylvania Department of Internal Affairs, 71, 106
  statistics of manufactures, 87, 88
Pensions, amount of
  express companies, 144
  Government, 216–217, 220, 291
  manufactures, 90
  persons with incomes under $2,000, 291
  railways, 126
  telephones, 184
Pensions, income from, 270
Personal service
  average annual incomes under $2,000, 285
    total earnings under $2,000, 288
  average wages of, 279
  number engaged in, 276, 280, 283, 284
    age and sex percentages, 279
Persons gainfully employed in U. S.
  families of farmers excluded, 32
  industrial distribution of, 32–39
  numbers of, how computed, 32
    see also employees
Persons, number of
  having incomes
    over $3,000, 258
Persons, number of (cont.)
  having incomes (cont.)
    over $2,000, 253, 260, 331
    by occupations, 283
    under $2,000, 270, 331
  reporting incomes, 256
Persons, percentage of
  having incomes over $2,000, 332–333
  having incomes under $2,000, 332–333
Persons, Warren M., 350
Per capita
  see population of U. S.
Physical products
  agriculture, output per person, 56–61
    indices of, 301
  banking, loans per person, 207–209
  construction per capita of population, 115
  electric light and power kilowatt hours, 167
  Government, share of, 53, 222–223
  measured in money, 317–320
  mines, quarries, oil wells, per employee, 75–77
  Pullman car-days, 139–140
  railways, passenger miles, 128–130
  relation to corporate surplus, 316–320
  street railways, revenue car miles, 155–156
  telephones, average, per employee, 186–188
  tonnage of American Merchant Marine, 198, 201
  transportation by water tonnage, 196
Plasterers, 107
Plumbers and gasfitters, 107
Police and fire departments, 211–218
Population, U. S.
  average per capita income, 337
  distributed by residence, 229
  effect of influenza on, 16–17
  method of estimating, 14–16
Population, U. S. ompared with
  agricultural ouput, 61
  banking facilities, 208–209
  construction, 115
  electric power service, growth of, 167
  mineral output, 75–77
  Pullman service, growth of, 139–140
  railway service, growth of, 130–131
  street railways, growth of, 156

Population, U. S., compared with (cont.)
telephone service, growth of, 189–190
tonnage of American Merchant Marine, 201
Postal service, U. S., 211–218
Poultry
and eggs, 45–46
raising, 230–231
Power companies, private
see electric light and power companies, private
Price indices
for business savings, 12
of consumption goods
used by well-to-do, 24–31
used by workers, 17–24
placed on 1913 basis, 11
see also index of prices
Price variations, how eliminated, 10–12
Printing, paper and, 81
Produce
see agricultural products
Professional services
number engaged in, 275, 280, 283–284
age and sex percentages, 279
average annual incomes under $2,000, 285, 288
Profits
see dividends
also entrepreneurs, share of
Profits, undivided
see surplus
also savings, business
Property owners
see entrepreneurs and property owners
Psychic income, defined, 3
Public service
number engaged in, 275, 280, 283–284
age and sex percentages, 279
average annual incomes under $2,000, 285, 288
Public utilities
proportion of dividends and surplus, 327
Pullman car transportation, 133–140
Pullman porters, tips paid to, 135–136
Purchasing power
comparison of price indices
for different classes, 31
for workers, 22–23
how computed, 10–12
Purchasing power (cont.)
index number for
well-to-do, 28–29
workers, 17–24
interest on savings deposits, 205
net value product of
all industries, 245
Government, 221–222
of bank loans and deposits, 208–209
of income, 333, 335, 337
Purchasing power of business savings
banking, 205
by industries, 237
electric light and power, 164
manufacturing, 97
mining etc., 69
Pullman transportation, 135
railways, 132
street railways, 153–154
telegraphs, 173–174
telephones, 182
transportation by water, 195
Purchasing power of employees' share
agriculture, 58
banking, 206
construction, 114
electric light and power, 166
express, 144
Government service, 215, 220
hand trades, 102
manufacturing, 91
mining, etc., 76
Pullman transportation, 137–138
railways, 131
street railways, 153
telegraphs, 178
telephones, 186
transportation, 118
transportation by water, 200
unclassified industries, 224
Purchasing power of property's share
agriculture, 59
banking, 205–206
by industries, 239, 241
construction, 112
electric light and power, 164
express, 143
government, 220
manufacturing, 97
mining, etc., 70
national income, 337

Purchasing power, etc. (cont.)
Pullman transportation, 135
railways, 132
street railways, 153–154
telegraphs, 174
telephones, 183
transportation, 116
transportation by water, 195
unclassified industries, 227

Quarries
see mines, quarries, and oil wells

Railways, steam, and switching and terminal companies, 119–132
additions to physical property of, 122
Red Cross, contributions by banks, 202, 207
Rediscounts, bank, 203
Relief for employees
see pensions
Rent, 292–293
fraction of total income received from, 386–392
Rental value of farms, 309–310
Rental value of owned homes, 228, 229, 291–294
tax exempt, 261, 267–268
Rents, contract, in U. S., 225–227
Rents, index number for, 294
Rents and royalties from
express companies, 141–142
manufacturing, 85, 86, 91, 92, 97
mines, etc., 66, 70, 75
street railways, 150–152, 154
telegraphs, 169, 172, 173
telephones, 180–182
unclassified industries, 225–229, 231–232
Reserves, corporate, 314–316, 320, 321
see also surplus, corporate
Rorty, M. C., 28, 112, 182, 206, 228, 272
Royalties
see rents and royalties

Salaries
see employees, share of, *also* wages and salaries
Salaries, government, state, city and county officials, 266–267
Savings, actual in corporate surplus, 329
Savings, business
all industries, 246
by industries, 234–237
included in income, 3
index of values for
banking, 204
electric light and power, 163–165
express, 143
manufacturing, 95–93
mining, etc., 69
Pullman transportation, 134–135
railways, 122–124, 127, 132
street railways, 150–152, 154
telegraphs, 173, 174, 176, 179
telephones, 180–182
transportation by water, 194, 195
transportation, 115
Savorgnan, F., 349
Saw mills, custom
see hand trades
School districts, 211–218
Scoville, G. P., 305–306
Sears, Roebuck & Co.
data used in price index, 18–19
Securities, corporate, total
held by banks, 203
Security holders, share of
banks, 203–204, 206–207
electric light and power company, 163–164
express companies, 141–142
Government securities, 218–219
manufacturing, 90–97
Pullman transportation, 134–137
railways, 123, 127, 132
street railways, 148–149
telegraph companies, 170
what it includes, 4
Security holders, disbursements to
from telegraph companies, 168
see also entrepreneurs and other property owners
Seed used by farmers, 50–51
Sewing machine repairing
see hand trades
Shelter
per cent of income paid for, 292–293
Shipbuilding
excluded from construction, 103
Shoe repairing
see hand trades

Silver, Gray, 337
Similarity of distribution
what constitutes, 375
Sinking funds, railway, 122
Slichter, C. S., 369
Slope of logarithmic income curves, 371–392
South Carolina
statistics of manufactures, 87, 88
Spillman, W. J., 301
Standardization of purchasing power
how obtained, 10
in terms of 1913 prices, 10
accuracy checked, 10
State and county government, 210–215
Steam fitters, 107
Steam railways
see railways
Steel, iron and, 88
Sterrett, J. E., 255, 276, 315, 321
Stewart, W. W., 300
Stock dividends, 320
Stockholders
average income of, 26
see also security holders, entrepreneurs
Stone cutters, 107
Stone masons, 107
Street and electric railways, 148–156
Structural iron workers, 107
Summary of Part I, 233–246
Summary of Part II, 330–339
Surplus, banking, 202–204
Surplus, corporate, 314–329
banking, 202–204
definition of, 314
general accuracy substantiated, 6, 84–86
genuineness of, 315–320
included in net income, 3, 314
proportion of, in earnings, 327
reports by corporations accepted, 6
total estimated, 324, 328, 329, 331, 382
see also savings, business
Switching companies, 119
see also railways
Sydenstricker, E., 342

Tailoring, custom
see hand trades
Tax-exempt income
see income, tax exempt
Taxes
relation to national income, 5
charged against industry, 5, 6
see also income tax, etc.
Taxidermy
see hand trades
Tax, income
see income tax
Teachers, income of, 296
Telegraphs, 168–178
Telephones, 179–190
messages and message miles, 190
revenue: business vs. residence, 189
Terminal companies, 119
see also railways
Textiles, 80
Tips to Pullman employees, 135–136
Tobacco manufactures, 82
Tonnage, American merchant marine, 198, 201
Topics covered, 10
Trade
number engaged in, 274, 275, 280, 283, 284
age and sex percentages, 279
average annual income under $2,000, 285, 288
Transportation, 116–118
see also steam railways; switching and terminal companies; street and electric railways; private electric light and power companies; transportation by water
Transportation by water, 191–201
mode of estimating gross earnings, 192–193
Typewriter repairing
see hand trades

Unclassified industries, 223–232
Uncollectible revenues, in
express companies, 144–145
railways, 126
telephones, 183
Understatement of incomes, 254–260
increase since armistice, 254–255
Undivided profits
see surplus, business savings
Unemployment, 271
estimated for U. S., 36–38
in Massachusetts factories, 36–38

United States Bureau of Mines
data from, 65–77
United States Bureau of Labor Statistics
see Bureau of Labor Statistics
United States, government of, all branches of,
data concerning, 210–222
U. S. Realty Company, 105–108, 112
Utilities, public
see public utilities

Value added by manufacture, 82
Value, gross
see gross value
Value product, gross
in agriculture, 303, 306–307
in construction, 109–112
in manufactures, 83
Value product, net
agriculture, 40, 54–55, 59, 62, 303
all industries, 244, 245
banking, 202, 206–207
construction, 113
electric light and power, 158–159, 164, 165
express, 144–145
government (all branches)
components of, 210
distribution of, 217–219
per capita, 220–221
purchasing power of, 221
share, in national, 221–222
street railways, 154
telegraphs, 173–176
telephones, 180–184
transportation, 116–117
transportation by water, 194, 199
unclassified industries, 231–232
Value product, net
employees' share in
see employees' share of
Value product, net (cont.)
entrepreneurs and property, share of,
see entrepreneurs, share of
security holders share in
see security holders
Value product, total
see value product, gross
Vegetables, 50–51
Victory loans, 264
see loans, liberty
Village government
see city and village government

Wage rates
vs. average annual earnings, 12, 34–38
see frequency distributions
Wage distributions, 418–423
Wages and salaries
in all industries, 242
relation to total income, 376, 392, 406–414
see employees, share, *also* employees, average annual earnings
Wages, index of, 279
Wallace, H. A., 312
War, affecting labor supply in unclassified industries, 224
War expenditures
price index of, 336
War Industries Board, 304, 325
Warren, G. F., 307
Watch repairing
see hand trades
Wealth, gross
agriculture, 300
Western Union Telegraph Company, 168–178
West Virginia Bureau of Mines, 71
Wireless telegraphs
see telegraphs
Wiremen, inside, 107
Wire mileage, telephone, 187–188
Wool and mohair, 46–47, 49

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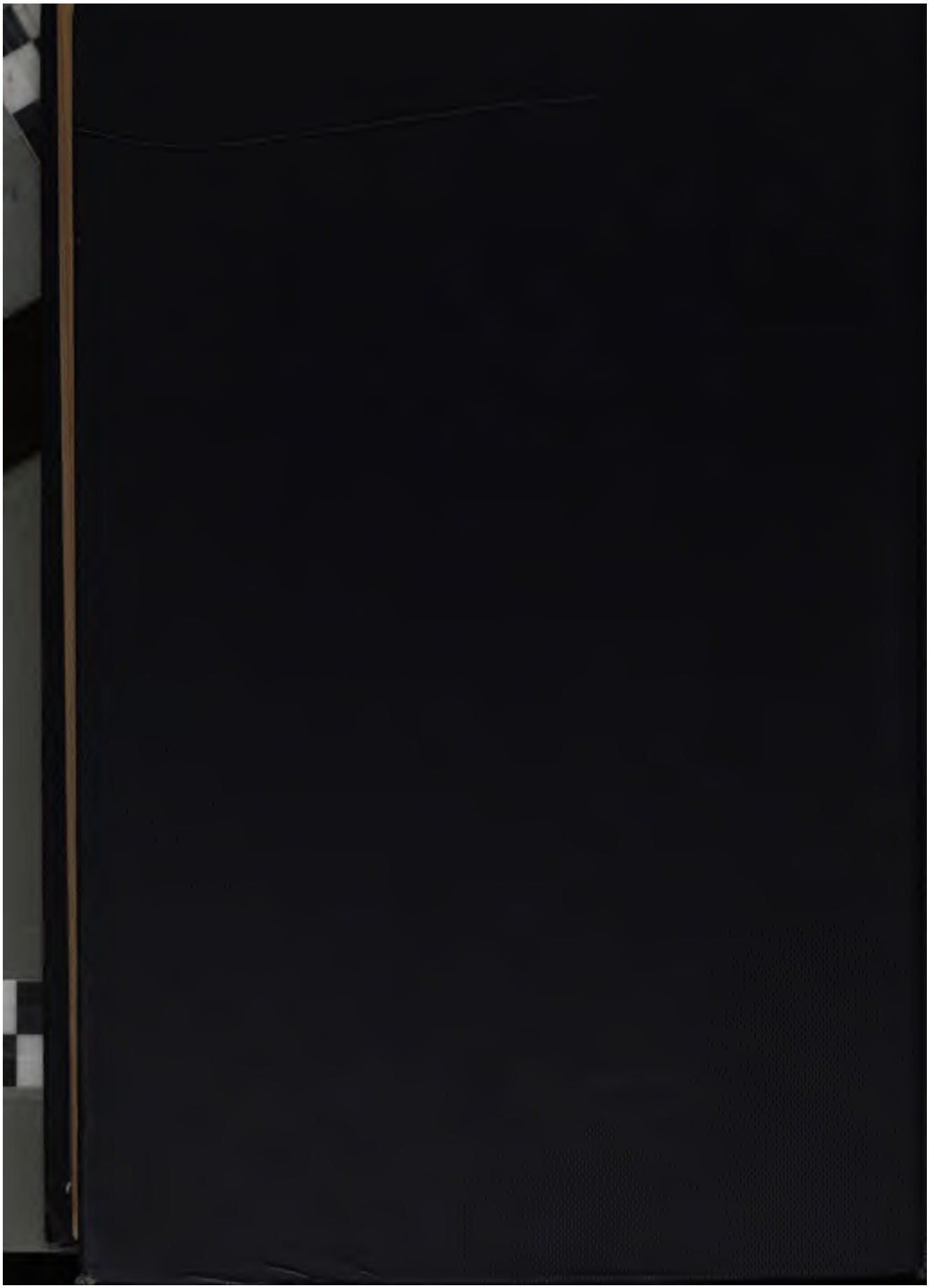
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